

**DYNAMIC MARKET VALUE FORECASTING USING
ARTIFICIAL NEURAL NETWORKS**

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**YAPAY SİNİR AĞLARI İLE DİNAMİK PAZAR DEĞERİ
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Artificial intelligence is one of the most popular research fields, even many artificial intelligence theme based movies are made. In such movies artificial intelligence especially began to think about sophisticated subjects, makes decisions and wants to take control of the world from humans. And a new war begins: Humans versus Machines. Although artificial intelligence is far away from that point, has such potential that makes people dream a possible war between intelligent machines and humans.

Artificial neural networks are an important branch of artificial intelligence. They implemented many areas successfully. In literature many artificial neural network models are used in finance and compared with the other methods. However, there are a few studies comparing the ANN models among themselves, which is the starting point of my thesis.

I wish to thank my supervisor Asst. Prof. Dr. Gülgün KAYAKUTLU, who guides me in the labyrinths of artificial neural networks, for her encouragement and support in my research. I also acknowledge Res. Asst. Didem ÇINAR for sharing her experience and for her helpful suggestions. I want to thank my family for their supports and encouragements in every subject. I am grateful to my friend İsmail BAŞOĞLU for his patience. And lastly I want to thank TUBİTAK for graduating supports.

I hope our hard work will lead many researchers like a lighthouse.

May 2008

Erkam GÜREŞEN

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ABBREVIATIONS

ADF	: Augmented Dickey-Fuller
ARCH	: Autoregressive Conditional Heteroscedasticity
ARIMA	: Autoregressive and Moving Average
ANN	: Artificial Neural Network
DAN2	: Dynamic Architecture for Artificial Neural Networks
EGARCH	: Exponential Generalized Autoregressive Conditional Heteroscedasticity
EWMA	: Exponentially Weighted Moving Average
FINN	: Fuzzy Interval Neural Network
GA	: Genetic Algorithm
GARCH	: Generalized Autoregressive Conditional Heteroscedasticity
HMM	: Hidden Markov Model
IIF	: International Institute of Forecasters
ISE	: Istanbul Stock Exchange
LSE	: Least Square Error
MAD	: Mean Absolute Deviate
MLP	: Multi Layer Perceptron
MSE	: Mean Square Error
NN	: Neural Network
PE	: Processing Element
PNN	: Polynomial Neural Network
PGP	: Polynomial Genetic Programming
RW	: Random Walk
SFINN	: Statistical Fuzzy Interval Neural Network
SSE	: Sum of Square Errors
VLSI	: Very Large Scale Integrated

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DYNAMIC MARKET VALUE FORECASTING USING ARTIFICIAL NEURAL NETWORKS

SUMMARY

Forecasting stock exchange rates is an important financial problem that is receiving increasing attention. During the last few years, a number of neural network models and hybrid models have been proposed for obtaining accurate prediction results, in an attempt to outperform the traditional linear and nonlinear approaches. This study evaluates the effectiveness of neural network models; multi layer perceptron (MLP), lagged time series (LTS), recurrent neural network (RNN), dynamic architecture for neural networks (DAN2) and the hybrid neural networks which use generalized autoregressive conditional heteroscedasticity (GARCH) and exponential generalized autoregressive conditional heteroscedasticity (EGARCH) to extract new input variables. The comparison for each model is done in two view points: MSE and MAD using real exchange daily rate values of Istanbul Stock Exchange (ISE) official main index XU100. In order to facilitate the comparison of training and testing data performance of the models, MAD % values are used.

When the error deviations of the models are analyzed, only DAN2 and DAN2 based hybrid models were able to capture whole nonlinearity. DAN2 also have many computational and architectural advantages when compared to the other ANN methodologies. In spite of all these advantages, DAN2 has fundamental defects discussed in this study. DAN2 is a dynamic architecture, which automatically adds hidden layers and constructs the network, but not dynamic output producer, which can not adapt changes in the environment.

YAPAY SINIR AĞLARI İLE DİNAMİK PAZAR DEĞERİ TAHMİNİ

ÖZET

Hisse senedi takas fiyatlarının tahmini son yıllarda artan bir ilgi gören önemli bir finansal problemdir. Son birkaç yılda, daha doğru tahminler yapmak için bazı yapay sinir ağları ve bazı hibrit modeller, geleneksel doğrusal ve doğrusal olmayan yöntemlerden daha iyi olmak üzere hazırlandı. Bu çalışma sırasıyla; çok katmanlı algılayıcılar (MLP), gecikmeli zaman serileri (LTS), yinelenen yapay sinir ağları (RNN), yapay sinir ağları için dinamik mimari (DAN2) ve bunların GARCH ve EGARCH modellerinden yeni girdiler alan hibrit modelleri değerlendirmiştir. Her bir model için değerlendirmede iki bakış açısı kullanılmıştır: hata karelerinin ortalaması ve ortalama mutlak sapma. Bu çalışmada İstanbul Menkul Kıymetler Borsasının (İMKB) resmi ana endeksi olan ulusal 100 endeksinin (XU100) gerçek takas değerleri kullanılmıştır. Eğitim ve test sırasındaki hataların daha iyi değerlendirilebilmesi amacıyla ortalama mutlak sapmaların yüzde değerleri hesaplanmıştır.

Modellerin hata sapma grafikleri incelendiğinde sadece DAN2 ve DAN2 tabanlı hibrit modellerin doğrusal olmayan ilişkileri tamamen öğrendiği görüldü. Ayrıca diğer metodlarla karşılaştırıldığında DAN2'nin bir çok hesaplama ve mimari avantajları olduğu da görüldü. Tüm bu üstünlüklerine rağmen DAN2'nin bazı temel eksiklikleri bu çalışmada ele alındı. DAN2 otomatik olarak gizli katman ekleyerek dinamik bir yapı izlenimi verirken çevre koşullarının değişmesine uyum sağlayamadığı için dinamik bir yapıdan uzaklaşmaktadır.

1. INTRODUCTION

Forecasting simply means understanding which variables lead to predict other variables (Mcnelis, 2005). This means a clear understanding of the timing of lead-lag relations among many variables, understanding the statistical significance of these lead-lag relations and learning which variables are the more important ones to watch as signals for predicting the market moves. Better forecasting is the key element for better financial decision making, in the increasing financial market volatility and internationalized capital flows.

Accurate forecasting methods are crucial for portfolio management by commercial and investment banks. Assessing expected returns relative to risk presumes that portfolio strategist understand the distribution of returns. In a firm, duty of a financial expert is to maximize the value of the firm, not to maximize the profit (Yanık, Şenel, 2007). Financial expert can easily model the affect of tangible assets to the market value, but not intangible asset like know-how and trademark. To model the market value, one of the best ways is the use of expert systems with artificial neural networks (ANN), which do not contain standard formulas and can easily adapt the changes of the market.

In literature many artificial neural network models are evaluated against statistical models for forecasting the market value. It is observed that in most of the cases ANN models give better result than other methods. However, there are very few studies comparing the ANN models do among themselves, which leads this study. The objective of our study is to compare classical ANN models and new ANN methodologies. The performances of twelve ANN models on the time series are studied to include basic models, genetically improved ones and the hybrid models. Secondary aim of this research has been to analyse the features and the deficiencies of the most performing model to give in depth information about the method of choice. Application of the analysed methods is implemented on the time series produced by daily exchange rates of Istanbul Stock Exchange (ISE) index XU100.

This thesis is so organized that section 2 provides brief information about artificial neural networks and section 3 gives the background of ANN applications on time series. Section 4 will follow to clarify the concepts on market value of a company. Section 5 is reserved for detailed explanation of the ANN methods analysed. The case study with all the analysed methods and the results achieved will be given in section 6. The final section concludes the research with a conclusion and recommendations for future research.

This study will not only make contribution to the ANN research but also to the business implementations of market value calculation.

2. DEFINITION OF AN ARTIFICIAL NEURAL NETWORK

Studies on artificial neural networks (ANNs) have been motivated right from its inception by the recognition that human brain computes in an entirely different way from the digital computer. The brain is a highly complex, nonlinear, and parallel computer (information-processing system). It has the capability to perform certain computations such as pattern recognition, perception, and motor control in very short time. For example the brain routinely accomplishes perceptual recognition tasks (e.g., recognizing a familiar face embedded in an unfamiliar scene) in approximately 100-200 milliseconds, whereas tasks of much lesser complexity may take minutes or hours on a conventional computer (Haykin, 1999).

The example given by Haykin (1999) about sonar of a bat is remarkable. Sonar is an active echo-location system that can provide information about how far away a target (e.g., a flying insect) is. In addition to location, bat sonar conveys information about the relative velocity of the target, the size of the target, the size of various features of the target and the elevation of the target. The complex neural computations are needed to extract this information from the target echo occurring within a brain the size of a plum. Besides, a bat can pursue and capture its target with a facility and success rate that would be the envy of a radar or sonar engineer.

How does a human brain or the brain of bat able to do it? At birth, a brain has great structure and ability to build up its own rules through time using what we usually called “experience”. The most dramatic development (i.e., hard-wiring) of the human brain taking place during the first two years from birth; but the development continues beyond that stage (Haykin, 1999).

The human brain has the capability to develop its structural constituents, known as *neurons*, which permits the developing nervous system to adapt to its surrounding environment. Just as this plasticity is essential to the functioning of neurons as information-processing units in the human brain, so it is with ANNs (here after called neural networks) made of artificial neurons (Haykin, 1999). In its most general

form, a neural network is a machine that designed to model the way the brain performs a particular task or function (Haykin, 1999). Thus we may use Haykin's (1999) following definition of a neural network viewed as an adaptive machine: *A neural network is a massively parallel distributed processor made up of simple processing units, which has a natural propensity for storing experiential knowledge and making it available for use. It resembles the brain in two respects: firstly, knowledge is acquired by the network from its environment through a learning process and secondly interneuron connection strengths, known as synaptic weights, are used to store the acquired knowledge.*

The procedure of learning process is called a *learning algorithm*, the function of which is to modify the synaptic weights of the network in an orderly fashion to attain a desired design objective (Haykin, 1999).

2.1 Artificial Neural Network Application Areas

In general ANNs can be used for every kind of problem especially when regression based models and statistical models give poor results or can not be applied because of the statistical assumptions. Neural networks are most useful in building nonlinear models. Tosun (2007) gives the following examples of ANN application areas:

- *Classification:* A data set is used to train the network for a desired output class category. By this way, ANN can be used for any kind of classification problem.
- *Clustering:* To determine the groups with the common features and the centres.
- *Optimization:* An optimization problem can be solved by using ANN; the first value of example set is used as input, and the set of solution values are received as outputs.
- *Fulfillment of examples:* When a defected example is entered to the neural network, a completed example can be received as output.
- *Artificial intelligence:* ANNs can be used for voice, face or image recognition.

- *Financing and investing:* ANNs can be used for credit analysis, insurance risks, option and future prediction, trend analysis, stock investing analysis.
- *Noise removing:* When an input set with noise is entered to the neural network, an output set without noise can be received.
- *Production:* Quality control and analysis models can be built and improved by using ANN models.
- *Medicine:* ANNs can be used for diagnosing a disease, classification of diseases, genetic mapping and blood mapping.
- *Science and engineering:* ANNs can be used for modeling complex problems, nonlinear problems, multivariate curve fitting, and climate modeling.

2.2 Benefits of Neural Networks

Haykin (1999) pointed out that a neural network has its computation power through its massively parallel distributed structure and its ability to learn and therefore generalize. *Generalization* refers to reasonable outputs generated by the neural network for inputs not encountered during training (learning). The following properties and capabilities of neural networks are reported by Haykin (1999):

- a) *Nonlinearity:* A neural network can be linear or nonlinear. A neural network, made up of an interconnection of nonlinear neurons, is itself nonlinear. Nonlinearity is a highly important property because in regression based methods modeler should sense the nonlinear relation and transform the input into a new input using a nonlinear function. Then check whether the new input and the output have linear relation. But neural networks derive any kind of nonlinear relation itself.
- b) *Input-Output Mapping:* A popular paradigm of learning called *learning with a teacher or supervised learning* involves modification of the synaptic weights of a neural network by applying a set of labeled training samples or task examples. Each example consists of a unique input signal and a corresponding desired response. The network is presented with an example picked at random from the set, and the synaptic weights (free parameters) of the network are modified to minimize the difference between the desired response and the actual response of the network produces by the input signal in accordance with an appropriate statistical criterion.

The training is repeated for many examples in the set until there are no further significant changes in the synaptic weights. The network learns from the examples by constructing an *input-output mapping* for the problem at hand. No prior assumptions are made on the model or inputs. Thus enables modeler to use any kind of input to achieve the output.

c) *Adaptivity*: Neural networks have a built-in capability to adapt their synaptic weights to changes in the surrounding environment. A neural network trained to operate in a specific environment can easily retrain to deal with minor changes in the operating environmental conditions. When a neural network is operating in a nonstationary environment, it can be designed to change its synaptic weights in real time. This property makes the architecture of neural network a useful tool for classification, signal processing, and control applications.

d) *Evidential Response*: In the context of pattern classification, a neural network can be designed to provide information not only about which particular pattern to select, but also about the confidence in the decision made. This latter information may be used to reject ambiguous patterns, should they raise, and thereby improve the classification performance of the network.

e) *Contextual Information*: Knowledge is presented by the structure and activation state of a neural network. Every neuron in the network is potentially affected by global activity of all other neurons in the network. Consequently, contextual information is dealt with naturally by a neural network.

f) *Fault Tolerance*: A neural network, implemented in hardware form, has the potential to be inherently fault tolerant, or capable of robust computation, in the sense that its performance degrades gracefully under adverse operating conditions. For example, if a neuron or its connecting links are damaged, recall of a stored pattern is impaired in quality. However, due to the distributed nature of information stored in the network, the damage has to be extensive before the overall response of the network is degraded seriously. Thus, in principle, a neural network exhibits a graceful degradation in performance rather than catastrophic failure.

g) *VLSI Implementability*: The massively parallel nature of a neural network makes it potentially fast for the computation of certain tasks. Same feature makes a neural network well suited for implementation using *very-large-scale-integrated*

(VLSI) technology. One particular beneficial virtue of VLSI is that it provides a means of capturing truly complex behavior in a highly hierarchical fashion.

h) *Uniformity of Analysis and Design:* Neural networks have universality as information processors because the same notation is used in all domains involving the application of neural networks. This feature manifests itself in different ways; firstly neurons, in one form or another, represent an ingredient common to all neural networks. Secondly, this commonality makes it possible to share theories and learning algorithms in different applications of neural networks. And lastly, modular networks can be built through a seamless integration of modules.

i) *Neurobiological Analogy:* The design of a neural network is motivated by analogy with the brain, which is a living proof that fault tolerant parallel processing is not only physically possible but also fast and powerful.

2.3 Biologic Nervous Systems & Artificial Neural Networks

The biologic nervous system may be viewed as a three stage system, as shown in the block diagram of Figure 2.1 (Haykin, 1999). Central to the system is the brain, represented by the neural net, which continually receives information, perceives it, and makes appropriate decisions. There are two arrow sets in the figure. Those pointing from left to right indicate the forward transmission of information-bearing signals through the system. The arrows, pointing from right to left, signify the presence of feedback in the system. The receptors convert stimuli from the human body or the external environment into electrical impulses that convey information to the neural net (brain). The effectors convert electrical impulses generated by the neural net into discernible responses as system outputs.

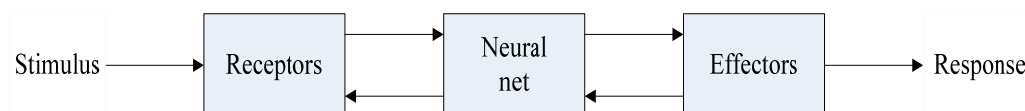


Figure 2.1: Block diagram representation of nervous system (Haykin, 1999)

There are many kinds of ANN architecture in literature, but a general ANN architecture can be shown as in Figure 2.2. In input layer there is at least one input element. In this layer input elements generates the same values of input without any processes (Tosun, 2007). There is at least one output element and in spite of input elements in output elements there is a process that generates the output (Tosun, 2007). Processing layers generally called *black box* because understanding each processing elements behaviors is a very difficult task. This layer(s) and functions used in these layers can change according to the ANN type.

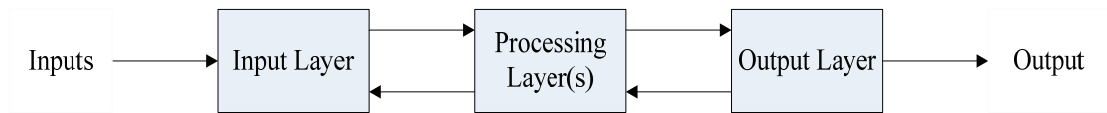


Figure 2.2: Block diagram representation of ANN architecture

Neurons are the structural constituents of biological nervous system. A general neuron and its parts are shown in Figure 2.3. With dendrites neuron collects the stimulus of previous neurons. In cell body this stimulus evaluated and an output stimulus is generated. This stimulus is send to next neurons with the axon. At this point axon can be divided into many parts and send the the stimulus to all connected neuron dendrites. The axon-dendrite connection areas are called *synapse*. The most common kind of synapse is a *chemical synapse*, which operates as follows; a presynaptic process liberates a transmitter substance that diffuses across the synaptic junction between neurons and then acts on a postsynaptic process (Haykin, 1999). Shortly a synapse converts a presynaptic electrical signal into a chemical signal then back into a postsynaptic electrical signal (Haykin, 1999). In an adult brain, plasticity, which permits the developing nervous system to adapt to its surrounding environment, may be accounted for by two mechanisms: the creation of new synaptic connections between neurons, and the modification of existing synapses (Haykin, 1999).

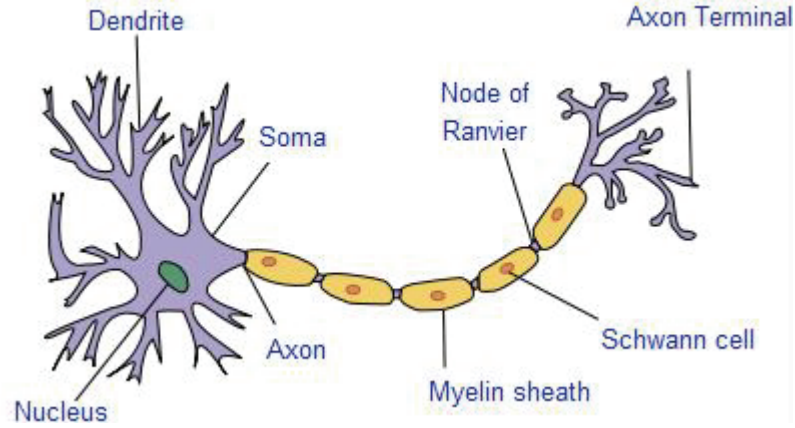


Figure 2.3: Structure of a typical neuron (from <http://en.wikipedia.org/wiki/Neuron>)

A processing element can be shown like in Figure 2.4. We can express the following similarities between processing elements (PEs) of ANN (also called neurons) and neurons of nervous system. The weights in PEs are Synapses. The summing junction is the dendrites that collect the inputs. Activation function is the cell body that processes the stimulus. And the output element is the axon that transports the output to the other neurons.

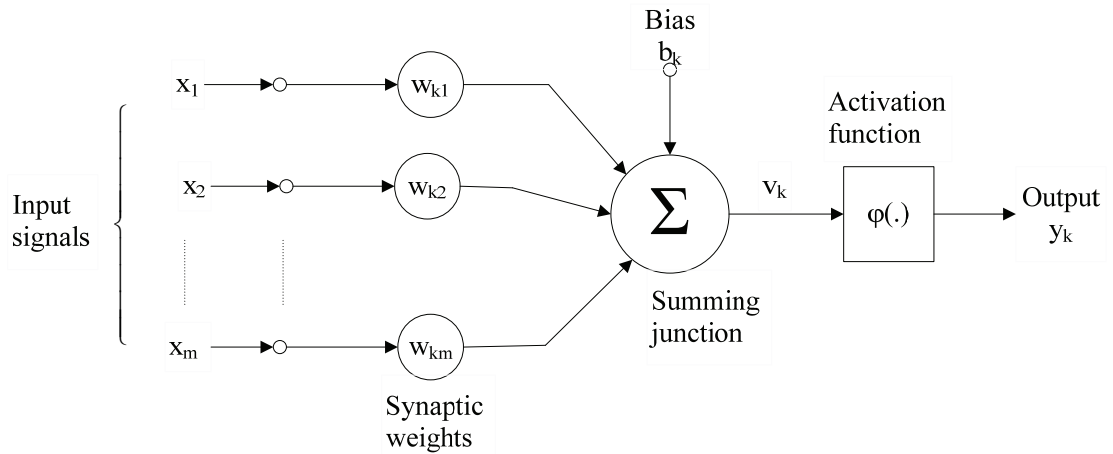


Figure 2.4: Model of a typical PE, (Haykin, 1999)

The neuron model shown in Figure 2.4 also includes an externally applied *bias*, denoted by b_k . The bias b_k has the effect of increasing or lowering the net input of the activation function depending on whether it is positive or negative, respectively (Haykin, 1999). Mathematically we can describe a neuron k by the following pair of equations:

$$u_k = \sum_{j=1}^m w_{kj} x_j \quad (2.1)$$

$$y_k = \varphi(u_k + b_k) \quad (2.2)$$

where $x_1, x_2, x_3, \dots, x_m$ are the input signals; $w_{k1}, w_{k2}, \dots, w_{km}$ are synaptic weights of neuron k ; u_k is the *linear combiner output* due to the input signals; b_k is the bias; $\varphi(\cdot)$ is the *activation function*; and y_k is the output signal of the neuron. The use of bias b_k has the effect of applying an *affine transformation* to the output u_k of the linear combiner in the model (Figure 2.4), as shown by

$$v_k = u_k + b_k \quad (2.3)$$

2.4 Types of Activation Function

The activation function, denoted by $\varphi(v)$, defines the output of a neuron in terms of the induced local field v . Here are the three basic types of activation functions (Haykin, 1999):

1. *Threshold Function*: For this type of the activation function, described in Figure 2.5(a),

$$\varphi(v) = \begin{cases} 1 & \text{if } v \geq 0 \\ 0 & \text{if } v < 0 \end{cases} \quad (2.4)$$

is used. In engineering literature, this form of a threshold function is commonly referred to as a *Heaviside function*. Correspondingly, the output of neuron k employing such a threshold function is expressed as

$$y_k = \begin{cases} 1 & \text{if } v_k \geq 0 \\ 0 & \text{if } v_k < 0 \end{cases} \quad (2.5)$$

where v_k is the induced local field of the neuron; that is,

$$v_k = \sum_{j=1}^m w_{kj} x_j + b_k \quad (2.6)$$

Such a neuron is referred to in the literature as the McCulloch-Pitts model in recognition of the pioneering work done by McCulloch and Pitts. In this model, the output of a neuron takes on the value of 1 if the induced local field of that neuron is nonnegative and 0 otherwise. This statement describes the *all-or-none property* of the McCulloch-Pitts model.

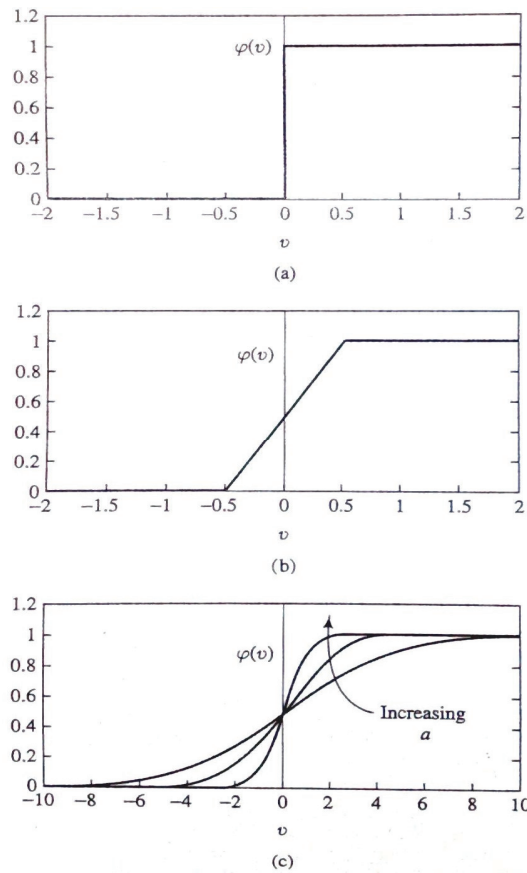


Figure 2.5: (a) Threshold function. (b) Piecewise-linear function. (c) Sigmoid function

2. Piecewise-Linear Function: For the piecewise-linear function described in Figure 2.5(b), the following equation is used:

$$\varphi(v) = \begin{cases} 1, & v \geq +\frac{1}{2} \\ v + \frac{1}{2}, & +\frac{1}{2} > v > -\frac{1}{2} \\ 0, & v \leq -\frac{1}{2} \end{cases} \quad (2.7)$$

where the amplification factor inside the linear region of operation is assumed to be unity. This form of an activation function may be viewed as an approximation to a nonlinear amplifier. The following two situations may be viewed as special forms of the piecewise-linear function (Haykin, 1999):

A linear combiner arises if the linear region of operation is maintained without running into saturation.

The piecewise-linear function if the amplification factor of the linear region is made infinitely large.

3. Sigmoid Function: The sigmoid function, whose graph is s-shaped, is by far the most common form of activation function used in the construction of artificial neural Networks. It is defined as a strictly increasing function that exhibits a graceful balance between linear and nonlinear behavior (Haykin, 1999). An example of the sigmoid function is the logistic function, defined by

$$\varphi(v) = \frac{1}{1 + \exp(-av)} \quad (2.8)$$

where a is the slope parameter of the sigmoid function. By varying the parameter a , we obtain sigmoid functions of different slopes, as illustrated in Figure 2.5(c). In fact, the slope at the origin equals $a/4$. In the limit, as the slope parameter approaches infinity, the sigmoid function becomes simply a threshold function assumes the value of 0 or 1, a sigmoid function assumes continuous range of values from 0 to 1. Note also that the sigmoid function is differentiable, whereas the threshold function is not.

The activation functions defined above range from 0 to +1. It is sometimes desirable to have the activation function range from -1 to +1, in which case the activation function assumes an antisymmetric form with respect to the origin; that is, the

activation function is an odd function of the induced local field. Specifically, the threshold function in Eq.(2.9) is now defined as

$$\varphi(v) = \begin{cases} 1 & \text{if } v > 0 \\ 0 & \text{if } v = 0 \\ -1 & \text{if } v < 0 \end{cases} \quad (2.9)$$

which is commonly referred to as the *signum function*. For the corresponding form of a sigmoid function we may use the *hyperbolic tangent function*, defined by

$$\varphi(v) = \tanh(v) \quad (2.10)$$

Allowing an activation function of the sigmoid type to assume negative values as above has some analytic benefits.

2.5 Learning Processes in Artificial Neural Networks

Haykin (1999) define learning in the context of neural networks as; learning is a process by which the free parameters of a neural network are adapted through a process of stimulation by the environment in which the network is embedded and the type of learning is determined by the manner in which the parameter changes take place. Haykin (1999) also added that this definition of learning process implies the following sequence of events:

- The neural network is stimulated by an environment.
- The neural network undergoes changes in its free parameters as a result of this stimulation.
- The neural network responds in a new way to environment because of the changes that have occurred in its internal structure.

Learning process in ANN is a kind of prize-penalty system (Çınar, 2007). If the output of ANN and the desired output are in the same direction, weights of ANN are strengthened. If the output of ANN and the desired output are not in the same direction, the weights are weakened to teach ANN to respond differently (Çınar, 2007).

In practice, neural networks with only one hidden layer can easily learn the problems with limited data and continuous functions (Çınar, 2007). Second hidden layer is only needed if the function is not continuous for some points. For many problems, researchers reported that only one hidden layer is enough and the second hidden layer slows the learning process (Çınar, 2007).

Feed forward term is the indicator of one way flow that the data had; from input layer to output layer. Output of each layer is the input of following layer and is the function of its inputs (Çınar, 2007).

Activation function determines the output value of each neuron. For complex problems it is important to have nonlinear activation functions (Çınar, 2007). Although Shape of the activation function doesn't affect the overall performance of the neural network, it affects the learning performance (Çınar, 2007).

Learning can be either online or batch. In *online learning* data used one by one for learning and in *batch learning* whole data is used at once for learning. In batch learning, learning (changes in free parameters of neural network) accumulated over the all patterns and the change is made once after a complete pass over the whole training set is used (Alpaydın, 2004). A complete pass over all the patterns is called an *epoch* (Alpaydın, 2004).

There are three types of learning; supervised learning, unsupervised learning and reinforcement learning.

2.5.1 Supervised Learning

It is also called learning with a teacher, because in conceptual terms, a teacher, having the knowledge of the environment, teaches the neural network with that knowledge being presented by a set of input-output examples (Haykin, 1999). Regression and classification problems are the examples of supervised learning (Alpaydın, 2004).

The following example gives better clarification of the supervised learning: let the teacher and the neural network both be exposed to a training vector drawn from the environment. By virtue of built-in knowledge, the teacher is able to provide the neural network with a desired response for that training vector (indeed, the desired response represents the optimum action to be performed by the neural network). The

network parameters are adjusted under the combined influence of the training vector and the error signal. The *error signal* is defined as the difference between the desired response and the actual response of the network. This adjustment is carried out iteratively in a step by step fashion with the aim of eventually making the neural network emulate the teacher; the emulation is presumed to be optimum in some statistical sense. In this way knowledge of the environment available to the teacher is transferred to the neural network through training as fully as possible.

2.5.2 Unsupervised Learning

It is also called learning without a teacher, because in spite of supervised learning only inputs of the problem are known. In unsupervised learning the goal is to determine the formation along the inputs (Çınar, 2007). Input space has a pattern and if analyzed it can be deduced which input are more repeated and which are less repeated. This is called density estimation in statistics (Alpaydın, 2004). When the patterns are discovered learning is completed; a new input's cluster can be determined (Haykin, 1999).

One method for density estimation is clustering where the aim is to find clusters or groupings of input. The following example of clustering is given by Alpaydın (2004): in the case of a company with a data of past customers. The data contains the demographic information as well as the past transactions with the company, and the company may want to see the distribution of the profile of its customers, to see what type of customers frequently occur. The author noticed that in such a case, a clustering model allocates customer similar in their attributes to the same group, providing the company with natural groupings of its customers. Alpaydın (2004) also added that once such groups are found, the company may decide strategies (for example, specific services and products to different groups).

2.5.3 Reinforcement Learning

In some applications, the output of the system is a sequence of actions. In such a case, a single action is not important; the policy, which is the sequence of correct actions to reach the goal, is important. In this case, neural network should be able to assess the goodness of policies and learn from past good action sequences to be able

to generate a policy. Such learning methods are called reinforcement learning (Alpaydın, 2004).

In reinforcement learning, like unsupervised learning, certain outputs are not used to train the neural network. But the desired outputs are defined as good output or bad output and then used to train the neural network (Çınar, 2007). But defining good or bad outputs are somehow similar to supervised learning.

Chess game can be an example of this type of learning because the rules of the game are limited but in many situations there is large number of possible moves (Alpaydın, 2004). In such a case one move is not important, the series of moves are important to win the game.

3. ANN APPLICATIONS ON TIME SERIES FORECASTING

The financial time series models expressed by financial theories have been the basis for forecasting a series of data in the twentieth century. Yet, these theories are not directly applicable to predict the market values which have external impact. The development of multi layer concept allowed ANN (Artificial Neural Networks) to be chosen as a prediction tool besides other methods. Various models have been used by researchers to forecast market value series by using ANN (Artificial Neural Networks). A brief literature survey is given in Table 3.1.

Gooijer and Hyndman (2006) reviewed the papers about time series forecasting from 1982 to 2005. It has been prepared for the silver jubilee volume of international journal of forecasting prepared for 25th birthday of International Institute of Forecasters (IIF). In this review many methods are review based on the methodology used (exponential smoothing, ARIMA, seasonality, state space and structural models, nonlinear models, long memory models, ARCH-GARCH). Gooijer and Hyndman (2006) compiled the reported advantages and disadvantages of each methodology and pointed out the potential future research fields. They also denoted existence of many outstanding issues associated with ANN utilisation and implementation stating when they are likely to outperform other methods. Last few years researches are focused on improving the ANN's prediction performance and developing new artificial neural network architecture.

Engle (1982) suggested the ARCH(p) (Autoregressive Conditional Heteroscedasticity) model, Bollerslev (1986) generalized the ARCH model and proposed the GARCH (Generalized ARCH) model for time series forecasting. By considering the leverage effect limitation of the GARCH model, the EGARCH (Exponential GARCH) model was proposed (Nelson 1991). Despite the popularity and implementation of the ANN models in many complex financial markets directly, shortcomings are observed. The noise that caused by changes in market conditions, it

is hard to reflect the market variables directly into the models without any assumptions (Roh 2007).

Table 3.1: Recent Financial Time Series Researches (ANN and Hybrid Models)

Date	Researchers	Used Method	Data Years	Data Type	Goal	Prediction Period	Results
2007	Preminger and Franck	Robust Liner Autoregressive and Robust Neural Network	1971-2004	GBP/\$ JPY/\$	To obtain better results than Standard linear autoregressive and Neural Network	1-3-6 months	Robust models are better than standart models but still are not better than RW (Random Walk)
2007	Hamzaçebi and Bayramoğlu	ARIMA and ANN	2002-2006	ISE-XU100	To compare ARIMA and ANN	Daily	ANN has better results
2007	Pekkaya and Hamzaçebi	LR (Linear regression) and ANN	1999-2006	YTL/USD	To compare the forecasts using macro economic variables	Monthly	ANN gives better results and predicts two important breaking point with 6.611 % error
2007	Roh	ANN, EWMA (Exponentially Weighted Moving Average), GARCH, EGARCH	930 trading days	KOSPI 200	To compare ANN with hybrid models	Daily	Classical ANN outperforms NN-EWMA NN-EGARCH For periods shorter than a month 100 % direction prediction and for periods shorter than 160 days min 50 % direction prediction, NN-GARCH For periods shorter than a month 100 % direction prediction and for periods shorter than 160 days min 50 % direction prediction
2007	Kumar and Ravi	ANN, Fuzzy Logic, Case-Based Reasoning, Decision Trees, Rough Sets			Review- Bankruptcy prediction (128 paper)		SVM outperforms logistic regression and BPNN Rough set based Ap. outperforms logistic regression and decision tree Logistic regression, LDA, QDA, FA clearly outperformed by ANN Hybrid methods combine the advantages and promising for future researches
2007	Celik and Karatepe	ANN	1989-2004	Monthly banking sector data series	Crises prediction		Financial ratios successfully predicted for 4 months
2005	Ghiassi, Saidane and Zimbra	ANN, ARIMA, DAN2 (Dynamic Architecture for ANN)		Time series used in literature	To compare the methods		DAN2. is an alternative of ANN and gives better result and only needs to choose the inputs
2006	Menezes and Nikolayev	Genetic Programming (GP) Polynomial Genetic Programming (PGP)		Time series used in literature	To compare the methods		The polynomials in time scries are found and promising for future researches
2007	Zhang and Wan	Fuzzy Interval NN (FINN)	1998-2001	JPY/USD GBP/USD	Exchange prediction	6 weeks	Promising for future researches
2007	Hassan, Nath and Kirlev	Hidden Markov Model (HMM), ANN, Genetik Algorithm (GA)	2003-2004	Stocks: Apple Computer Inc., IBM, Dell Inc.	Exchange prediction	5 weeks	Hybrid model is better than HMM and ARIMA
2005	Yümlü, Gürgen and Okay	Mixture of Experts (MoE), MLP, RNN, EGARCH	1990-2002	ISE XU100 daily values	Exchange prediction & To compare the methods	4 years	MoE outperforms the aother models EGARCH is outperformed by all other methods

Preminger and Franck (2007) used a robust linear autoregressive and a robust neural network model to forecast exchange rates. Their robust models were better than classical models but still are not better than Random Walk (RW).

Hamzaçebi and Bayramoğlu (2007) used ARIMA and ANN models to forecast ISE-XU100 index. ANN gives better results than ARIMA. Pekkaya and Hamzaçebi (2007) used linear regression to forecast monthly USD/YTL exchange rates. In this research ANN gives better results and ANN predicts two important breaking points with 6.611% error.

Roh (2007) used classical ANN and EWMA (Exponentially Weighted Moving Average), GARCH and EGARCH models with ANN. NN-EGARCH model outperforms the other models with a %100 hit ratio for forecasting periods smaller than 10 days.

Kumar and Ravi (2007) reviews 128 papers about bankruptcy prediction of banks and firms. This review shows that ANN clearly outperforms many methods and hybrid systems can combine the advantages of the methods.

Celik and Karatepe (2007) used ANN to predict banking crisis. They used monthly banking sector data series and predicted financial ratios successfully for 4 months.

Ghiassi et al. (2005) evaluated ANN, ARIMA and DAN2 (Dynamic Architecture for Artificial Neural Networks) using popular time series in literature. DAN2, is a new NN architecture first developed by Ghiassi and Saidane (2005), clearly outperforms the other methods. DAN2 is pure feed forward NN architecture and detailed information about this architecture will be given in section 5.

Menezes and Nikolaev (2006) used a new NN architecture and named it PGP (Polynomial Genetic Programming). It is based on PNN (Polynomial Neural Network) first developed by Ivakhnenko (Menezes and Nikolaev, 2006). This architecture uses polynomials to build a NN. Menezes and Nikolaev (2006) uses genetic algorithm to estimate NN parameters such as starting polynomials, weight estimation etc. This study gives better result for some problems. PGP is a new promising architecture but it needs improvement (Menezes and Nikolayev, 2006).

Zhang and Wan (2007) developed a new NN architecture SFINN (Statistical Fuzzy Interval Neural Network) based on FINN (Fuzzy Interval Neural Network). They use SFINN to predict JPY/USD and GBP/USD exchanges rates. An important point is FINN predicts an interval not only a value. This new architecture is also promising but it needs improvement like PGP.

Hassan et al. (2007) used a hybrid model including HMM (Hidden Markov Model), ANN and GA (Genetic Algorithm). They test hybrid model on stock exchange rates. Hybrid model is better than ARIMA and HMM only model. This hybrid model is promising and needs improvements too (Hassan et al., 2007).

This literature survey shows that ANNs generally outperforms other methods when applied on time series. Further, new architectures like DAN2, PGP, SFINN and Hybrid models, based on HMM, GA and ANN, are promising but only DAN2 clearly outperforms all compared models.

4. MARKET VALUE

“Market Value is the estimated amount for which a property should exchange on the date of valuation between a willing buyer and a willing seller in an arms-length transaction after proper marketing wherein the parties had each acted knowledgeably, prudently, and without compulsion” (URL-2). This simply means value of an asset on market. Market value is very important, because it shows how much will be paid in the action of selling or buying.

In a firm, duty of a financial expert is to maximize the value of the firm (Yanık, Şenel, 2007). While maximizing value of a firm, financial expert will use market value. Because when financial expert uses other value types, i.e. book value, intangible assets like know-how and trademark can not be valued effectively.

Stock markets have a key role for showing market value of an asset. On a stock market it is easy to see how much money will be paid for an asset by investors. Indeed value is a human judgment and it will change rapidly. For example a century ago silver was a precious metal that used for making coins, and making expensive jewelleries. Today silver is used for making cheap jewelleries and efficient electronic devices. Nowadays people are building technology on silver, because silver and gold have the less electric resistance than other elements and silver is cheaper than gold. Ten years later human judgments can change, and as an industrial metal, silver can go up in value. In this point of view, stock markets are best places for gathering information about assets value as a human judgement.

Today stock markets have important problems like speculators, overvalued stocks, unfair taxes, and insider trading (having unpublicised news of a firm and acting with respect to them). Governments are making new laws to avoid these problems but can not avoid entirely. Despite these problems stock markets are the best places to determine the market value of a firm.

In stock markets indexes are used as tools showing the general trends in markets. This is why official main index of Istanbul Stock Exchange is used instead of a specific firm.

5. SELECTED ANN METHODS APPLIED TO PREDICT THE MARKET VALUE

To select the ANN methods applied in time series forecasting, a literature survey is done. In this survey new ANN and hybrid methodologies; polynomial genetically programmed (PGP), fusion model of hidden markov model (HMM), artificial neural network ANN and genetic algorithm GA, statistical fuzzy interval neural networks, dynamic architecture for artificial neural networks (DAN2), generalized autoregressive conditional heteroscedasticity-neural network (GARCH-NN) and exponential generalized autoregressive conditional heteroscedasticity-neural network (EGARCH-NN) are found. From this methods and classic neural network methods well performed ones, according to the developers and authors conclusions, are selected for this study.

5.1 Multilayer Perceptron (MLP)

This model uses last 4 values of XU100 as inputs, and generated by using NeuroSolutions 5.06 software. MLP has two layers using tanh neurons. The number of neurons in each layer and learning rate is calculated by genetic algorithm using the same software. In this model there are 2 hidden layers with tanh activation functions. Model is shown in Figure 5.1.

MLP model has 4 layer with 2 hidden layers as shown in Figure 5.1. x_{t-1} , x_{t-2} , x_{t-3} and x_{t-4} are the input values as mentioned above and y_t is the output of model. In this model number of neurons is calculated by genetic algorithm suggested by Çınar (2007) and Principe et al. (1999). 2 hidden layers with tanh neurons are used in this model according to the model complexity, suggested by Alpaydın (2004). For this model 20% of training data is used for crossvalidation as suggested by Principe et al. (1999). In this model back propagation algorithm is used for supervised learning and to increase efficiency momentum learning is used.

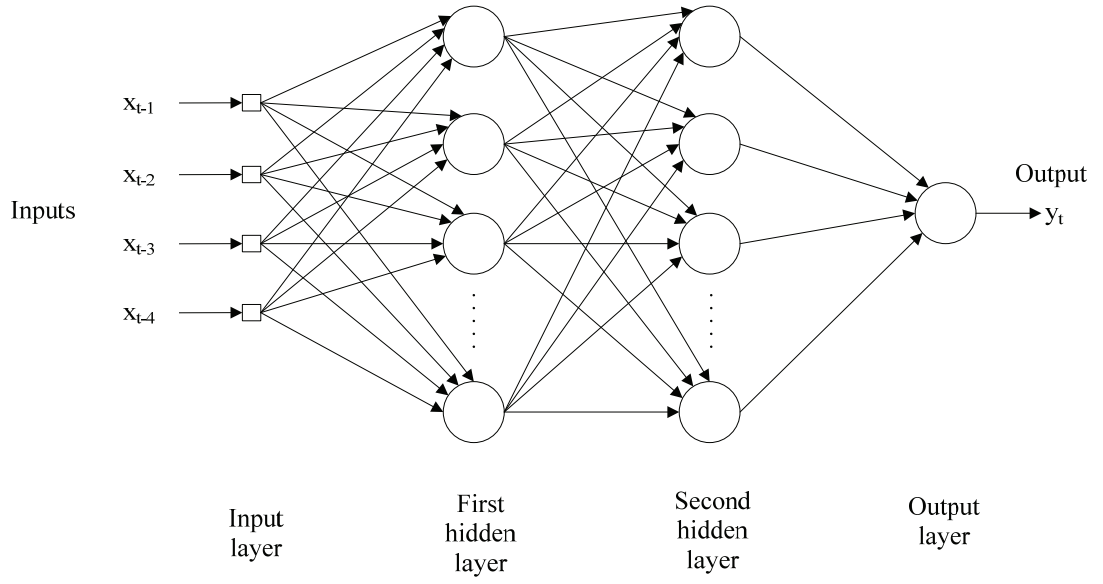


Figure 5.1: The MLP model

The multilayer perceptron is one of the most widely implemented neural network topologies. In terms of mapping abilities, the MLP is believed to be capable of approximating arbitrary functions (Principe et al., 1999). This has been important in the study of nonlinear dynamics, and other function mapping problems.

Two important characteristics of the multilayer perceptron are: its nonlinear processing elements (PEs) which have a nonlinearity that must be smooth (the logistic function and the hyperbolic tangent are the most widely used); and their massive interconnectivity, i.e. any element of a given layer feeds all the elements of the next layer (Principe et al., 1999).

MLPs are normally trained with the backpropagation algorithm (Principe et al., 1999). The backpropagation rule propagates the errors through the network and allows adaptation of the hidden PEs. The multilayer perceptron is trained with error correction learning, which means that the desired response for the system must be known.

Error correction learning works in the following way: From the system response at PE i at iteration n , $y_i(n)$, and the desired response $d_i(n)$ for a given input pattern an instantaneous error $\varepsilon_i(n)$ is defined by

$$\varepsilon_i(n) = d_i(n) - y_i(n) \quad (5.1)$$

Using the theory of *gradient descent learning*, each weight in the network can be adapted by correcting the present value of the weight with a term that is proportional to the present input and error at the weight, i.e.

$$w_{ij}(n+1) = w_{ij}(n) + \eta \delta_i(n) x_j(n) \quad (5.2)$$

The local error $\delta_i(n)$ can be directly computed from $\varepsilon_i(n)$ at the output PE or can be computed as a weighted sum of errors at the internal PEs. The constant η is the step size and called the learning rate. This procedure is called the backpropagation algorithm.

Backpropagation computes the sensitivity of a cost functional with respect to each weight in the network, and updates each weight proportional to the sensitivity. The beauty of the procedure is that it can be implemented with local information and requires just a few multiplications per weight, which is very efficient. Because this is a gradient descent procedure, it only uses the local information so can be caught in local minima. Moreover, the procedure is inherently noisy since we are using a poor estimate of the gradient, causing slow convergence (Principe et al., 1999).

Momentum learning is an improvement to the straight gradient descent in the sense that a memory term (the past increment to the weight) is used to speed up and stabilize convergence. In momentum learning the equation to update the weights becomes

$$w_{ij}(n+1) = w_{ij}(n) + \eta \delta_i(n) x_j(n) + \alpha (w_{ij}(n) - w_{ij}(n-1)) \quad (5.3)$$

where α is the momentum. Normally α should be set between 0.1 and 0.9.

Training can be implemented in two ways: Either we present a pattern and adapt the weights (on-line training), or we present all the patterns in the input file (an epoch), accumulate the weight updates, and then update the weights with the average weight update. This is called batch learning. Principe et al., (1999) reported that online learning and batch learning are theoretically equivalent, but the former sometimes has advantages in tough problems (many similar input -output pairs).

To start backpropagation, loading an initial value for each weight (normally a small random value) is needed, and proceeding until some stopping criterion is met. The

three most common are: to cap the number of iterations, to threshold the output mean square error, or to use cross validation. Cross validation is the most powerful of the three since it stops the training at the point of best generalization (i.e. the performance in the test set) is obtained (Principe et al., 1999). To implement cross validation one must put aside a small part of the training data and use it to see how the trained network is doing (e.g. every 100 training epochs, test the net with a validation set). When the performance starts to degrade in the validation set, training should be stopped (Alpaydm, 2004; Haykin, 1999; Principe et al., 1999).

Measuring the progress of learning is fundamental in any iterative training procedure. The learning curve (how the mean square error evolves with the training iteration) is such a quantity. The difficulty of the task and how to control the learning parameters can be judged from the learning curve. When the learning curve is flat, the learning rate should be increased to speed up learning. On the other hand, when the learning curve oscillates up and down, the step size should be decreased. In the extreme, the error can go steadily up, showing that learning is unstable. At this point the network should be reset. When the learning curve stabilizes after many iterations at an error level that is not acceptable, it is time to rethink the network topology (more hidden PEs or more hidden layers, or a different topology altogether) or the training procedure (other more sophisticated gradient search techniques).

Principe et al. (1999) present below a set of heuristics that will help decrease the training times and, in general, produce better performance;

- Normalizing training data,
- Using the tanh nonlinearity instead of the logistic function.
- Normalizing the desired signal to be just below the output nonlinearity rail voltages (i.e. when using the tanh, the desired signals of ± 0.9 instead of ± 1).
- Setting the step size higher towards the input (i.e. for a one hidden layer MLP, set the step size at 0.05 in the synapse between the input and hidden layer, and 0.01 in the synapse between the hidden and output layer).
- Initializing the net's weights in the linear region of the nonlinearity (dividing the standard deviation of the random noise source by the fan-in of each PE).

- Using more sophisticated learning methods (quick prop or delta bar delta).
- Always having more training patterns than weights. It can be expected that the performance of the MLP in the test set to be limited by the relation $N > W/\epsilon$, where N is the number of training epochs, W the number of weights and ϵ the performance error. The MLP should be trained until the mean square error is less than $\epsilon/2$.

5.2 Lagged Time Series (LTS)

This model is generated by using NeuroSolutions 5.06 software wizard. This model uses lagged values of the financial time series. LTS has 2 layers with tanh neurons and each layer have lagged connections. The number of neurons in each layer and learning rate is calculated by genetic algorithm using the same software. This model has only one input neuron.

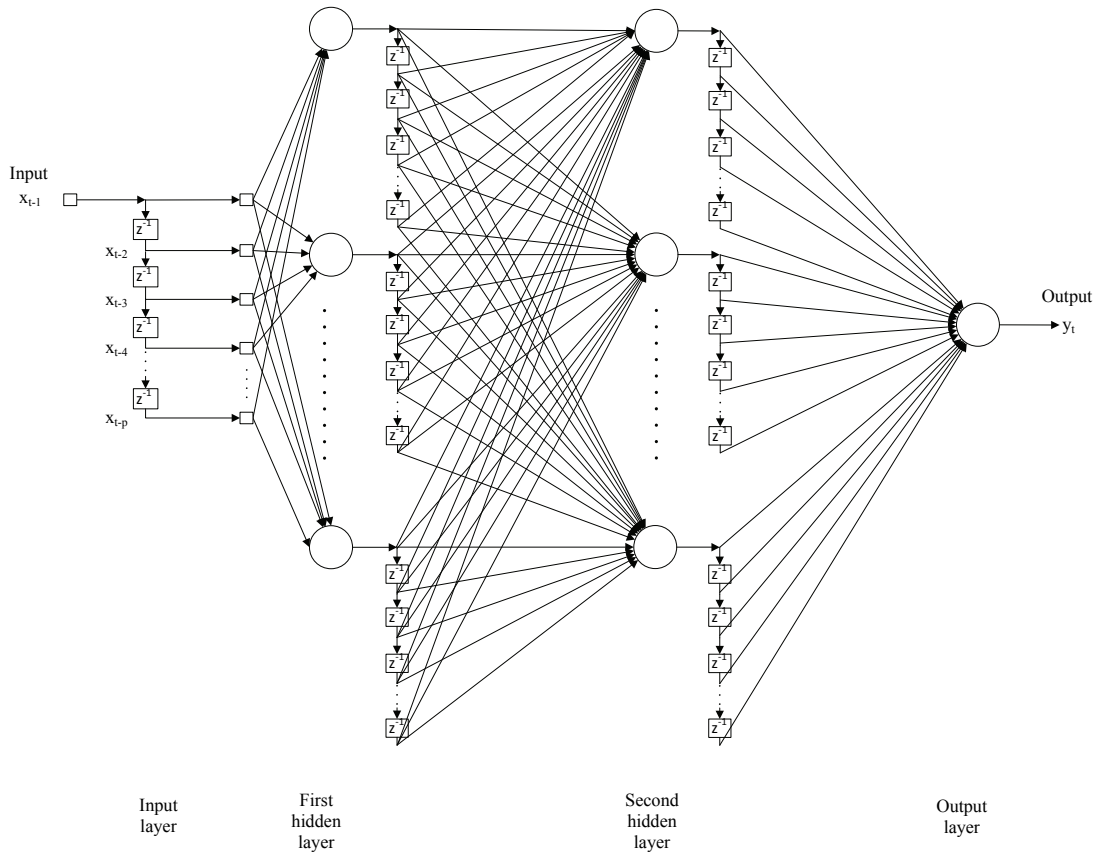


Figure 5.2: The LTS model

LTS model has 4 layer with 2 hidden layers as shown in Figure 5.2. This model uses one input and delays inputs using laguarre memory elements. z^{-1} shows a unit

delay in the model. p is the number of delays. In this model p is 4; which means the same number of input as the other models. y_t is the output of model. Number of neurons is calculated by genetic algorithm for this model, suggested by Çınar (2007) and Principe et al. (1999). 2 hidden layers with tanh neurons are used in this model according to the model complexity, suggested by Principe et al. (1999) and Alpaydın (2004). For this model 20% of training data is used for crossvalidation as suggested by Principe et al. (1999). In this model back propagation algorithm is used for supervised learning and to increase efficiency momentum learning is used. In the software laguarre memory elements called “LaguarreAxon” in the software.

The LaguarreAxon memory structure is built from a low-pass filter with a pole at $z = (1-\mu)$, followed by a cascade of K all-pass functions. This provides a recursive memory of the input signal’s past. The axon receives a vector of inputs, therefore the LaguarreAxon implements a vector memory structure. The memory depth is equal to K/μ , where K is the number of taps and is the Laguarre coefficient. The Laguarre coefficient is implemented by the axon’s weight vector, i.e. $\mu=w_i$. This allows each PE to have its own coefficient, each of which can be adapted. The delay between taps, τ , is an adjustable parameter of the component. The Weights access point of the LaguarreAxon provides access to the Laguarre coefficient vector (w_i in the following tap activation function);

$$T^0(z, w_i) = \frac{\sqrt{1 - (1 - w_i)^2}}{1 - (1 - w_i)z^{-\tau}} \quad (5.4)$$

$$T^k(z, w_i) = \frac{1 - (1 - w_i)}{z^\tau - (1 - w_i)}, k > 0 \quad (5.5)$$

5.3 Recurrent Neural Network (RNN)

This model uses last 4 values of XU100 as inputs and generated by using NeuroSolutions 5.06 software wizard. RNN has 2 layers with tanh neurons and each layer have recurrent connections. The number of neurons in each layer and learning rate is calculated by genetic algorithm using the same software.

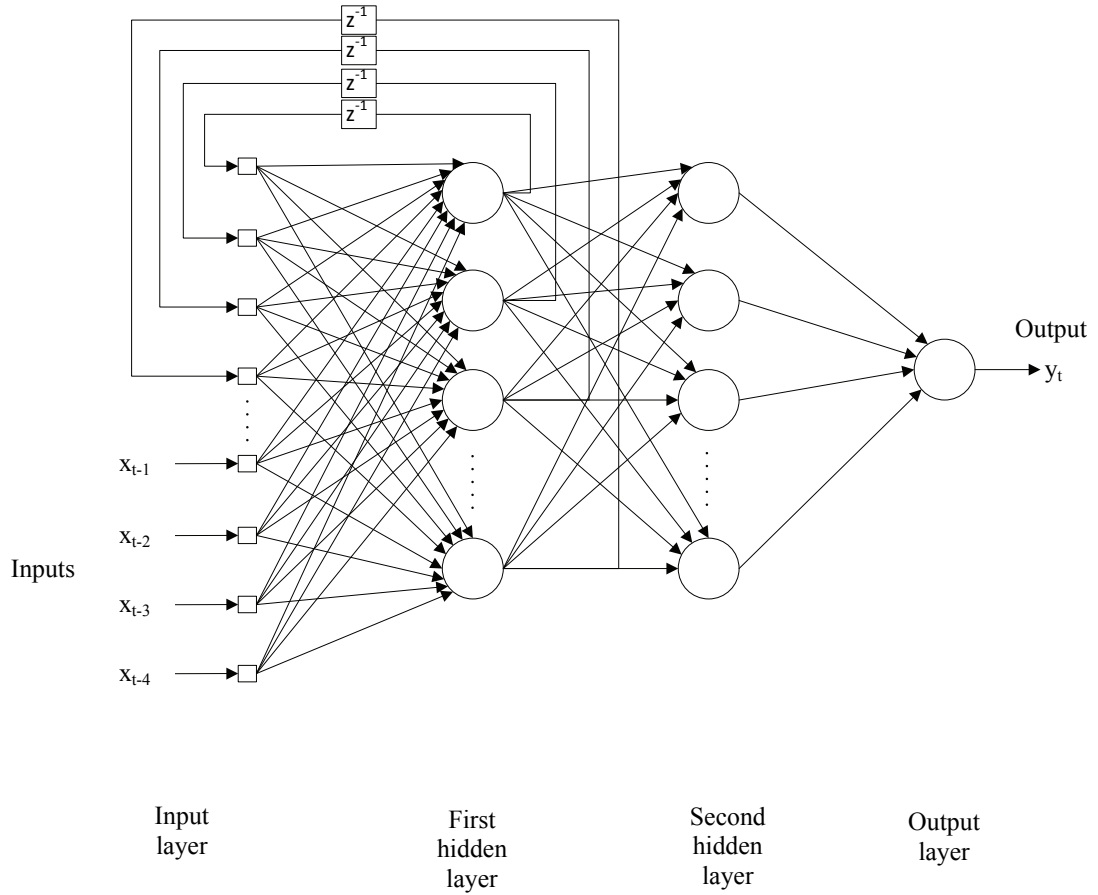


Figure 5.3: The RNN model

RNN model has 2 hidden layers as shown in Figure 5.2. This model uses one input and delays inputs using laguarre memory elements. z^{-1} shows a unit delay in the model. x_{t-1} , x_{t-2} , x_{t-3} and x_{t-4} are the input values as mentioned above and y_t is the output of model. Number of neurons is calculated by genetic algorithm for this model, suggested by Çınar (2007) and Principe et al. (1999). 2 hidden layers with tanh neurons are used in this model according to the model complexity, suggested by Alpaydın (2004). For this model 20% of training data is used for crossvalidation as suggested by Principe et al (1999). In this model back propagation algorithm is used for supervised learning and to increase efficiency momentum learning is used.

5.4 Dynamic Architecture for Artificial Neural Networks (DAN2)

This model is developed by Ghiassi and Saidane (Ghiassi and Saidane 2005) and compared with existing models using known time series (Ghiassi et al. 2005). Figure 5.4 shows the structure of DAN2.

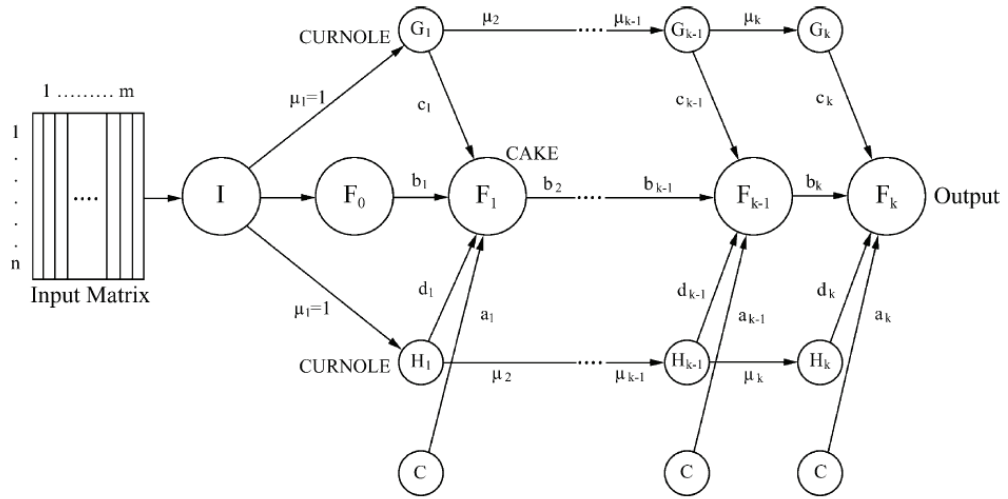


Figure 5.4: The DAN2 Network Architecture (Ghiassi and Saidane 2005)

The general philosophy of DAN2 model is based upon the principle of learning and accumulating knowledge at each layer, propagating and adjusting this knowledge forward to the next layer, and repeating these steps until the desired network performance criteria are reached (Ghiassi and Saidane 2005). Therefore DAN2 is a pure feedforward neural network.

DAN2 uses entire set of input data simultaneously to train the network. Training begins with a special F_0 node captures the linearity using classical linear regression. If the desired level of accuracy is reached training process stops. For nonlinear relations each time a hidden layer is added. Each hidden layer there has 4 nodes: one C node, one CAKE node (in Figure 5.4, F nodes) and two CURNOLE nodes (in Figure 5.4, G and H nodes). A CAKE (Current Accumulated Knowledge Element) node captures an adequate portion of learning achieved in previous layers using previous layers CAKE node. With a linear combination of CURNOLE (Current Residual Nonlinear Element) nodes, C node and previous CAKE node, existing CAKE node provides the results. Until the desired level of accuracy reached a hidden layer is added to the model.

After the nonlinear component of the input data in special linear layer (F_0), Ghiassi and Saidane (2005) transforms the input data set to model the nonlinearity of the process in subsequent iterations. DAN2 uses a vector projection approach to perform data transformation which defines a reference vector to normalize the data. This normalization defines α_i 's where α_i is the angle between the observation vector i and

the reference vector. DAN2 uses the trigonometric transfer functions to capture the nonlinearity. Each G and H nodes at layer k uses the given formula:

$$G_k(X_i) = \text{Cosine}(\mu_i \times \alpha_i), H_k(X_i) = \text{Sine}(\mu_i \times \alpha_i) \quad (5.6)$$

Using the given formula of $G_k(X_i)$ and $H_k(X_i)$ we can use the following formula for F nodes:

$$F_k(X_i) = a_k + b_k F_{k-1}(X_i) + c_k \text{Cosine}(\mu_i \times \alpha_i) + d_k \text{Sine}(\mu_i \times \alpha_i) \quad (5.7)$$

5.4.1 The Dynamic Learning Algorithm of DAN2

The algorithm steps given by Ghiassi and Saidane (2005) are as follows:

For input matrix $X = \{X_i; i=1,2,\dots,n\}$ as n independent records of m attributes let $X_i = \{x_{ij}; j=1,2,\dots,m\}$, and the reference vector $R = \{r_j; j=1,2,\dots,m\}$

1. The initial linear layer:

$$F_0(X) = a_0 + \sum_j b_{0j} x_{ij} \quad (5.8)$$

2. Subsequent hidden layers' CAKE node at iteration k :

$$F_k(X_i) = a_k + b_k F_{k-1}(X_i) + c_k G_k(X_i) + d_k H_k(X_i) \quad (5.9)$$

3. The CURNOLE node's input and transfer function at iteration k ($k=1,2,\dots,K$; where K is the maximum sequential iterations or number of hidden layers) is defined as:

- a) Specify a random set of m constant representing the "reference" vector R (default $r_j=1$ for all $j=1, 2, \dots, m$).

- b) For each input record X_i , compute the scalar product:

$$R \times X = \sum_j r_j x_{ij} \quad (5.10)$$

- c) Compute the length (norm) of the vector R and a record vector

$$X_i : \|R\| = \sqrt{\sum_j r_j^2}; \|X_i\| = \sqrt{\sum_j x_{ij}^2} \quad (5.11)$$

d) Normalize $R \times X$ to compute

$$(R \times X)_N = (R \times X_i) = (R \times X_i) / (\|R\| \times \|X_i\|) \quad (5.12)$$

Recall that:

$$(R \times X_i)_N = (\|R\| \times \|X_i\|) \times \cos(\text{angle}(R, X_i)) \quad (5.13)$$

thus,

$$\cos(\text{angle}(R, X_i)) = (R \times X_i) / (\|R\| \times \|X_i\|) = (R \times X_i)_N \quad (5.14)$$

For $i=1,2,\dots, n$; compute

$$\text{angle}(R, X_i) = \arccos((R \times X_i)_N) = \alpha_i \quad (5.15)$$

e) Compute the transferred nonlinear component of the signal as:
 $G_k(X_i) = \cos(\mu_k \times \alpha_i)$, $H_k(X_i) = \sin(\mu_k \times \alpha_i)$, μ_k is a constant multiplier for iteration k .

f) Replacing $G_k(X_i)$ and $H_k(X_i)$ in Equation 5.9 will result

$$F_k(X_i) = a_k + b_k F_{k-1}(X_i) + c_k \cos(\mu_k \times \alpha_i) + d_k \sin(\mu_k \times \alpha_i) \quad (5.16)$$

Data normalization in DAN2 can be represented by the trigonometric function $\cos(\mu_k \times \alpha_i + \theta)$. At each layer vector R is rotated and shifted to minimize the resulting total error. This rotating and shifting, shown in Figure 5.5, can be done by using the trigonometric function $\cos(\mu \times \alpha_i + \theta)$ (Ghiassi and Saidane, 2005). This formulation uses two (nonlinear) parameters, μ and θ . Ghiassi and Saidane (2005) reported that the latter can be replaced through the use of two trigonometric function of the form: $A \times \cos(\mu \times \alpha_i) + B \times \sin(\mu \times \alpha_i)$. The learning algorithm, the process and the calculation of μ are discussed in Ghiassi and Saidane (2005).

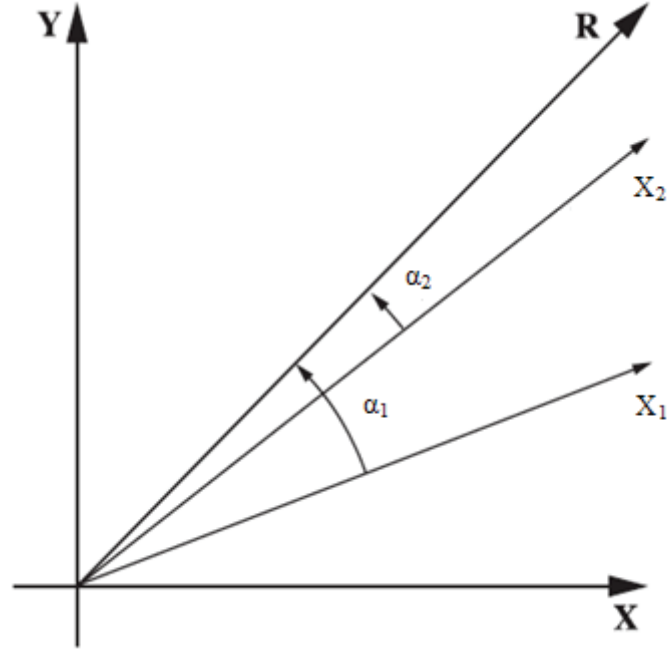


Figure 5.5: The observation and reference vector (Ghiassi et al, 2005)

If the model training stops too early, the network is said to be *under-trained* or *under-fitted*. An under-trained model often has high SSE values for either or both the training and validation data sets. Under-training often occurs when there are insufficient data for model fitting. DAN2 uses $\varepsilon_1 = (SSE_k - SSE_{k-1}) / SSE_k \leq \varepsilon_1^*$ to assess existence or absence of under-training in the models (Ghiassi and Saidane, 2005). Over-training or over-fitting is a more common problem in neural net modeling. A neural network modeler considered over-fitted (over-trained) when the network fits the in sample data well but produces poor out-of-sample results. To avoid over-fitting, Ghiassi and Saidane, (2005) divide the available in-sample data into the training and validation data sets. At each iteration k , ($k > 1$), they compute MSE values for both the training (MSE_T) and validation (MSE_V) sets and they use $\varepsilon_2 = |MSE_T - MSE_V| / MSE_T \leq \varepsilon_2^*$ to guard against over-fitting. The modeler should consider fully trained when the user specified accuracy criteria and the over fitting constraint are both satisfied. The accuracy levels ε_1^* and ε_2^* are problem dependent and should determined experimentally (Ghiassi and Saidane, 2005).

5.5 GARCH - ANN Models

Autoregressive conditional heteroscedasticity (ARCH) model considers the variance of the current error term to be a function of the variances of the previous time period's error terms. ARCH relates the error variance to the square of a previous period's error. If an autoregressive moving average model (ARMA model) is assumed for the error variance, the model is a *generalized autoregressive conditional heteroskedasticity* (GARCH). In that case, the GARCH(p, q) model (where p is the order of the GARCH terms σ^2 and q is the order of the ARCH terms ε^2) is given by

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \dots + \alpha_q \varepsilon_{t-q}^2 + \beta_1 \sigma_{t-1}^2 + \dots + \beta_p \sigma_{t-p}^2 = \alpha_0 + \sum_{i=1}^q \alpha_i \varepsilon_{t-i}^2 + \sum_{i=1}^p \beta_i \sigma_{t-i}^2 \quad (5.17)$$

Most of the financial series models are known to be easily modelled by GARCH(1,1), so this research uses the extracted variables from GARCH(1,1) as Roh suggests (2007). The GARCH(1,1) has the following formula:

$$\sigma_t^2 = \alpha_0 + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \quad (5.18)$$

Where σ_t is volatility at t , α_0 is the nonconditional volatility coefficient, ε_{t-1}^2 residual at $t-1$, σ_{t-1}^2 is the variance at $t-1$.

The newly extracted variables are as follows (Roh 2007):

$$\sigma_t^{2'} = \beta_1 \sigma_{t-1}^2 \quad (5.19)$$

$$\varepsilon_{t-1}^2 = \alpha_1 \varepsilon_{t-1}^2 \quad (5.20)$$

We use these new variables as additional inputs for every type of ANN given above.

5.6 EGARCH - ANN Models

EGARCH has the leverage effect with the following formula:

$$\ln \sigma_t^2 = \alpha + \beta \ln \sigma_{t-1}^2 + \gamma \left(\left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} - \sqrt{\frac{2}{\pi}} \right| \right) + \omega \left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right) \quad (5.21)$$

Where α is the nonconditional variance coefficient, $\ln \sigma_t^2$ is the log value of variance at $t-1$, $(\left| \varepsilon_{t-1}/\sigma_{t-1} - \sqrt{2/\pi} \right|)$ is the asymmetric shock by leverage effect, and $(\varepsilon_{t-1}/\sigma_{t-1})$ is the leverage effect. The newly extracted variables are as follows (Roh 2007):

$$\ln \sigma_{t-1}^2 = \beta \ln \sigma_{t-1}^2 \quad (5.22)$$

$$\text{LE (leverage effect)} = \gamma \left(\left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} - \sqrt{\frac{2}{\pi}} \right| \right) \quad (5.23)$$

$$\text{L(leverage)} = \omega \left(\frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right) \quad (5.24)$$

6. CASE STUDY

In this study, daily rate values of Istanbul Stock Exchange (ISE) National 100 Index (XU100) from January 2003 to March 2008 are used (well known name in Turkish is IMKB100) . In the following section brief information about ISE is given as stated in the ISE official web site.

6.1 Brief Information about ISE

6.1.1 Trading and Order Execution Systems of ISE

In December 1985 the Istanbul Stock Exchange inaugurated. The fully computerized trading system of the Istanbul Stock Exchange (ISE) is completed in November 1994. The system enables the ISE members to trade in stocks and rights coupons. The stock trading activities are carried out in two separate sessions, one session in the morning and the other in the afternoon. Computerized trading significantly improved the speed of execution and increased the daily trading capacity.

Prices are determined on a “multiple price-continuous auctions” method, utilizing a computerized system that automatically matches buy and sell orders on a price and time priority basis. The buyers and sellers enter the orders into the computer system through their workstations located at the ISE building or at the broker’s head office. It is a blind order system with trading ISE members identified upon matching. All information regarding transparency, except standing order IDs, are displayed in the trading system during the sessions.

6.1.2 Lot Sizes and Types of Stock Market Orders

For the companies traded on the ISE, the standard "lot size" or the unit of trading is 1 share (1 share = 1 YTL nominal). The system enables members to execute several types of orders such as "limit," "limit value," "fill or kill," "special limit," and "good till date" type orders. Members can enter buy and sell orders with various validity

periods of up to one trading day. Unmatched orders without a specific validity period are cancelled at the end of the trading session.

Every order involving a price limit is also limited by a maximum lot quantity. Lot limits are 250, 500, 1.000, 2.500, 5.000, 10.000 or 25.000 lots. The maximum trading limit for an order is YTL 1,5 million /order for all types of orders except special orders. For rights coupons, one round lot represents the subscription coupons of a stock with a total nominal value of 1 YTL.

6.1.3 Regulations Regarding Price Fluctuations

The Base Price is determined by rounding the previous session's weighted average price to the nearest price tick. Price margins are generally limited to 10 % above or below the base price. However, in the rights issue market, the margin is 25 %. Upper limits are rounded upwards and lower limits downwards with the appropriate price tick. The best bid, offer and closing prices of stocks, indices and number of stocks are shown on screens and text lines in the trading floors.

6.2 ISE's Stock Markets

6.2.1 National Market

All companies included in the National Market fulfil the listing requirements pre-determined by the ISE. Currently, 100 companies selected from among the listed companies in the National Market are included in the ISE National 100 Index, which is the main index of the ISE Stock Market.

Settlement of securities traded in the National Market is realized by the ISE Settlement and Custody Bank Inc. (Takasbank), which is the sole and exclusive central depository in Turkey.

- Settlement period of T+2 days
- Multilateral netting system
- Payments cleared by same day funds
- Delivery Versus Payment (DVP)

6.2.2 Second National Market

The “Second National Market” was established with the aim of promoting trading in stocks of small and medium size companies incorporated in all parts of the country, in a reliable and transparent environment. The Second National Market consists of companies delisted temporarily or permanently from the ISE's National Market as well as companies that fail to fulfil the listing requirements and lack the necessary qualifications for trading on the ISE's National Market. Companies meeting the criteria for trading on the Second National Market are admitted to this market upon the decision of the Executive Council of the ISE.

Settlement of securities traded in the Regional Markets is realized by the ISE Settlement and Custody Bank Inc. (Takasbank), which is the sole and exclusive central depository in Turkey.

- Settlement period of T+2 days
- Multilateral netting system
- Payments cleared by same day funds
- Delivery Versus Payment (DVP)

6.2.3 New Economy Market

The “New Economy Market” was formed in order to enable telecommunication, information technologies, electronic, internet, computer manufacturing, software and hardware, media or technology companies with growth potential operating in related fields to offer their stocks to the public via the ISE, which enables trading of such stocks in an organized market. It also provides capital for their investments which, in turn, will contribute to the development of the capital markets in Turkey.

6.2.4 Watch List Companies Market

The "Watch List Companies Market" was established with an aim to provide an organized and liquid market for trading of stocks of companies under special surveillance and investigation due to extraordinary situations with respect to stock transactions and/or companies traded on the ISE; disclosure of incomplete, inconsistent and/or untimely information to the public; failure to comply with the

existing rules and regulations as well as other situations leading to delisting of stocks and/or dismissal from the related market temporarily or permanently in order to protect investors' rights and public interest. The Watch List Companies Market began to operate on December 4, 1996 and the trading takes place between 14:00-15:00.

6.2.5 Wholesale Market

The “Wholesale Market” provides for trading of stocks in large quantities. The market permits the sale of stocks which are traded on the ISE's National and Regional Markets as well as those which are not traded on the ISE, through capital increases or sale of stocks of existing shareholders to pre-determined and/or unidentified buyers. Block sale of stocks within the framework of privatization scheme of public entities are also realized in this market.

Settlement of securities traded in the Wholesale Market is realized by the ISE Settlement and Custody Bank Inc. (Takasbank) which is the sole and exclusive central depository in Turkey. Subject to the ISE's approval, the buyer and seller may request Takasbank, in written form, not to settle the securities. The settlement period is T+2 (two work days following the trade date). Delivery Versus Payment (DVP) method is utilized.

6.2.6 Data Dissemination and Publications

Trading information, daily market information as well as statistics are disseminated through international and local data vendors on a real time basis. Market Information is also broadcasted via Turkish Radio and Television on teletext on real-time basis in Turkish.

Statistical information as well as corporate news is also provided in the ISE's periodical publications. The ISE publishes daily, weekly, monthly (in Turkish and English) and quarterly bulletins (in Turkish and English). The yearbook of companies, the annual fact book as well as publications introducing the ISE, video cassettes dubbed in English, French, and Japanese are also available. Most of the publications are also available in English.

6.2.7 Reporting Requirements and Surveillance

The companies traded on the ISE are obliged to submit to the ISE their financial statements on a quarterly basis according to the standards required by the Capital Markets Board. The six-month and annual financial results have to be independently audited. In addition to reporting all corporate actions to the ISE, the traded companies are also required to comply with the disclosure requirements.

The Surveillance Department and trading floor specialists monitor inter and intra-day activities to detect any unusual price movements, trading volumes, illegal practices such as manipulation, insider trading and artificial market activities. In addition to computer-assisted surveillance, the Istanbul Stock Exchange scans various news sources and collects information about the financial, legal and managerial positions of traded companies. When any misleading information is encountered, the nature of suspicion and the evidence are reported to the Chairman and CEO of the Istanbul Stock Exchange.

6.3 ISE Stock Market Indices

ISE indices are composed in order to calculate price and return performances of all shares as well as on the basis of relative markets and sectors. Until the end of 1996, the ISE used to compute only the ISE-100, Financials and Industrials price indices. As from 1997, the ISE began to calculate sector and sub-sector indices on the basis of prices and total return.

ISE price indices are computed and published throughout the trading session while the return indices are calculated and published at the close of the session only. The ISE National-100 Index is used as a main indicator of the National Market.

ISE National-All Shares Index is composed of all National Market companies except investment trusts.

ISE National-30 is composed of National Market companies except investment trusts and will also be used for trading in the Derivatives Market. The constituent 30 companies are selected on the basis of pre-determined criteria directed for the companies to be included in the indices.

ISE National-50 is composed of National Market companies except investment trusts. The constituent 50 companies are selected on the basis of pre-determined criteria directed for the companies to be included in the indices. ISE National-50 Index contains the ISE National-30 Index companies.

ISE National-100, which has been calculated since the inception of the ISE, is composed of National Market companies except investment trusts. The constituents of the ISE National-100 Index are selected on the basis of pre-determined criteria directed for the companies to be included in the indices. ISE National-100 Index contains the ISE National-50 and ISE National-30 Index companies.

Sector and sub-sector indices are composed of National Market companies excluding investment trusts.

ISE Second National Market Index is composed of companies traded in the Second National Market. The name “Regional Markets” is changed to Second National Market as of March 03, 2003.

ISE New Economy Market Index is composed of companies traded in the New Economy Market.

ISE Investment Trusts Index is composed of investment trust stocks traded in the National Market.

As from 1997, the Istanbul Stock Exchange calculated the values of all indices as an integer while two decimal numbers were added to the integer as from 1998.

ISE also computes and maintains all indices in U.S. dollar terms and ISE National-100 Index in Euro terms.

6.3.1 Calculation of ISE Stock Market Indices

The ISE indices are weighted by the market capitalization of the publicly held portion (the stocks kept in custody at Takasbank, except those kept in non-fungible accounts) of each constituent.

The basic formula for calculating ISE’s float capitalization-weighted indices is as follows:

$$\text{ISE Index}_t = \frac{\sum_{i=1}^n P_{it} N_{it} FW_{it}}{D_t} \quad (6.1)$$

P_{it} = The closing price of the stock 'i' at period 't'

N_{it} = The total number of shares outstanding of the stock 'i' at period 't' (Paid-in capital / 1,000)

FW_{it} = The flotation weight (publicly-held portion, i.e. the ratio of stocks kept in custody at Takasbank, except those kept in non-fungible accounts) of the stock 'i' at period 't'

D_t = The value of divisor at period 't' (Adjusted base market value)

n = Total number of stocks included in the index.

6.3.2 Selection criteria for the companies to be included in the ISE national-30, ISE national-50 and ISE national-100 indices

ISE Executive Council shall determine the stocks to be included in the ISE indices following the evaluation of market data on a quarterly basis.

The constituent companies of the ISE National-30, ISE National-50 and ISE National-100 indices must fulfil the following pre-requisites:

- a) The stocks of the company traded in the National Market should have been traded on the Exchange for at least 60 days in order to be included in the ISE National-30, ISE National-50 and ISE National-100 Indices. A company which starts to be traded in the National Market within the Evaluation Period and with a stock value offered to the public equivalent or greater than 2% of the total market value of National Market stocks kept in custody at Takasbank (Except those kept in non-fungible accounts) as of the date of public offering, is not subject to this rule.
- b) For companies having more than one group of stocks (e.g. group A, group B, group C etc.) only one group is included.

The stocks are ranked according to the highest market value (3-month average number of stocks kept in custody at Takasbank are used in calculation of market value) and daily average traded values (The traded values of the first 20 trading days of the stocks those started to be traded within the Evaluation Period are excluded)

and those stocks which have the highest market values and daily average trading values are included in the ISE National-30, ISE National-50 and ISE National-100 indices.

6.3.3 Periodic Review and Adjustments

The composition of the ISE National-30, ISE National-50 and ISE National-100 indices are reviewed and adjusted 4 times on a quarterly basis for the periods January-March, April-June, July-September and October-December.

Evaluation periods are last 12 months for daily traded values and last 3 months for the ratio of the stocks kept in custody at Takasbank. Evaluation periods end a month before each quarter.

Periodic adjustments are announced 15 days before each quarter.

The periodic adjustments to the constituent stocks of ISE National-30, ISE National-50 and ISE National-100 Indices are fulfilled according to the following pre-requisites:

a) At the end of the evaluation period, eligible stocks are ranked according to highest market capitalization of stocks kept in custody at Takasbank (except those kept in non-fungible accounts) and daily average traded values. A non-constituent stock will be included at the periodic review if it rises above the position stated below for the relevant index.

- ISE National-30 : Risen to 25th or above
- ISE National-50 : Risen to 45th or above
- ISE National-100 : Risen to 90th or above

b) At the end of the evaluation period, eligible stocks are ranked according to highest market capitalization of stocks kept in custody at Takasbank (except those kept in non-fungible accounts) and daily average traded values. A constituent stock will be excluded at the periodic review if it falls below the position stated below for the relevant index.

- ISE National-30 : Fallen to 36th or below
- ISE National-50 : Fallen to 56th or below

- ISE National-100 : Fallen to 111th or below

c) If, in case the number of stocks included in the indices exceed or fall below the number of stocks excluded from the indices, necessary adjustments will be made.

Reserve List: 2 stocks for the ISE National-30, 3 stocks for the ISE National-50 and 5 stocks for the ISE National-100 are selected as reserve stocks to use for any non-periodic changes stated below.

6.3.4 Non-Periodic Changes

- Stocks trading of which will be halted permanently will be excluded from all indices. In this case, reserve stocks will be included in the ISE National-30, ISE National-50 and the ISE National-100 Indices.
- Stocks market of which will be closed for more than 5 consecutive trading days, will be excluded from the relevant indices. Stocks excluded from the ISE National-30, ISE National-50 or ISE National-100 indices will be replaced by reserve stocks.
- Stocks which have been excluded from the indices due to closure of their markets for more than 5 consecutive trading days will not be re-included in the ISE National-30, ISE National-50 and the ISE National-100 indices until the end of the quarter. Whereas, these stocks will be re-included in the relevant market, sector and sub-sector indices on the same day they begin trading.
- Stocks, started to be traded in another market, will be included in the indices related to its new market and excluded from the old ones. Stocks excluded from the ISE National-30, ISE National-50 and ISE National-100 indices will be replaced by reserve stocks. If, excluded stocks re-start trading in the National Market, these will not be re-included in the ISE National-30, ISE National-50 and ISE National-100 indices until the end of the quarter. Whereas, these stocks will be re-included in the relevant market, sector and sub-sector indices on the same day they re-start trading in the National Market.
- Stocks, started to be traded within the quarter, are included in the relevant market, sector and sub-sector indices on the 11th trading day.
- Upon a merger activity of two constituent companies or an acquisition of a constituent company, the stocks of resulting company will remain within the relevant indices and the stocks of the acquired (discontinued) company will be replaced by the reserve stocks.
- If a constituent company of the ISE National-30, ISE National-50 or ISE National-100 Index is split into two or more companies, only one of the resulting companies with the highest market capitalization will continue to be a constituent of the relevant indices until the end of the quarter while the other companies are excluded.

6.4 Data Clarification

This study conducted experiments to evaluate the proposed models. Data used in experiments is composed of daily rate values of Istanbul Stock Exchange (ISE) National 100 Index (XU100) from January 2003 to March 2008 (well known name in Turkish is IMKB100), as seen in Figure 6.1.



Figure 6.1: ISE XU100 closing values from January 2003 to March 2008

To verify the appropriateness of GARCH and EGARCH models the ADF (Augmented Dickey-Fuller) test using web-reg, a freeware MS Office Excel add-in is used. This test gives information about stability. Data is converted to the logarithmic value of index returns (Figure 6.2). As a result of the ADF test (Table 6.1), this transformed data is stationary that is oscillating around a mean value 0. Both GARCH and EGARCH calculations are done with the same add-in.

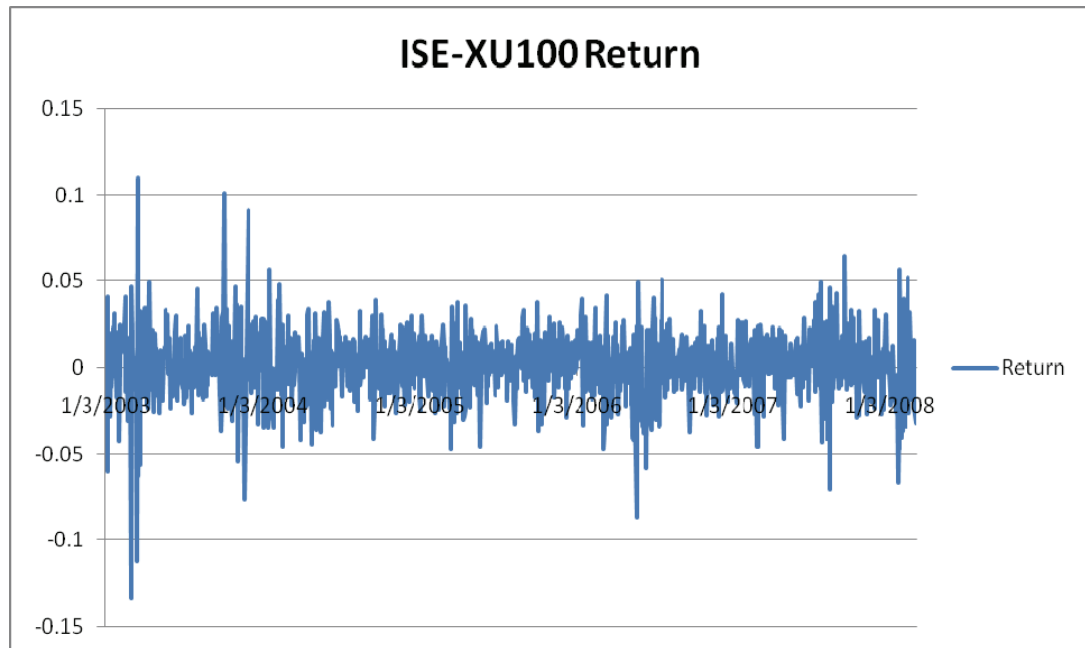


Figure 6.2: ISE XU100 returns from January 2003 to March 2008

Table 6.1: ADF test of ISE XU100 index logarithmic returns

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-25.616593	0.000000
Test critical values: 1% level	-3.435239	
5% level	-2.863580	
10% level	-2.567882	

The market is a bull market (going upwards) with the following descriptive statistics given in Table 6.2.

Table 6.2: Descriptive statistics of ISE XU100 index data

			Statistic	Std. Error
ISEXU100	Mean		30661.44	377.81946
	95% Confidence Interval for Mean	Lower Bound	29920.24	
		Upper Bound	31402.64	
	5% Trimmed Mean		30417.41	
	Median		29579.40	
	Variance		2E+008	
	Std. Deviation		13643.42	
	Minimum		8892.65	
	Maximum		58231.90	
	Range		49339.25	
	Interquartile Range		23927.43	
	Skewness		.099	.068
	Kurtosis		-1.199	.135

6.5 Experimental Setup

After calculating the ISE XU100 index logarithmic returns new input variables are calculated for GARCH-NN and EGARCH-NN hybrid models. Thus this study evaluates the following 12 models; MLP, LTS, RNN, DAN2, GARCH-MLP, GARCH-LTS, GARCH-RNN, GARCH-DAN2, EGARCH-MLP, EGARCH-LTS, EGARCH-RNN, and EGARCH-DAN2. For MLP, LTS, RNN, GARCH-MLP, GARCH-LTS, GARCH-RNN, EGARCH-MLP, EGARCH-LTS and EGARCH-RNN NeuroSolutions 5.06 software is used. For calculating DAN2, GARCH-DAN2 and EGARCH-DAN2 MS Office Excel is used.

For MLP, LTS and RNN based model, learning rate and number of neurons should be determined. Since DAN2 has a fixed number of nodes in each layer and in each layer using linear regression all the available experience is captured, there is no need to determine learning rate or number of neurons. For calculating learning rate and number of neurons genetic algorithm, which is optional property in NeuroSolutions 5.06 software, is used. All models are calculated by using a PC with the following properties; 2.0 GHz Intel Core2 Duo processor with 667 Mhz FSB, 1 GB DDR2 ram and 256 MB NVIDIA GeForce Go 7300 display adapter. By experience and trial-error method it is seen that genetic algorithm finds excellent results within 3 minutes. To make a fair evaluation, genetic algorithm is limited to work maximum 5 minutes.

Searching free parameters of NN's for days with genetic algorithm won't be logical because DAN2 algorithm is calculated using MS Excel with only dragging the cells; once the table of a layer is done.

The data set is divided into three groups. First two groups; *training* and *cross validation* are used for preventing the neural network from under or over training. Both training and cross validation errors are observed during the training of neural network and training stopped when the error began to increase or cross validation error began to oscillate. And to test the generalization ability of the model, test data is used. By this way behaviour of the neural network is observed with unseen data. These stopping rules are also valid for DAN2 and some additional rules are formulated by Ghiassi and Saidane (2005), however in this study, DAN2 and DAN2 based models training stopped in the first hidden layer because of the increasing cross validation error.

First 1132 days of index data is used for training and cross validation and last 160 days of data is used for testing. In the Table 6.3. descriptive statistics of training (and cross validation) data set are given. And in the Figure 6.3 graph of the training data is given. In the Table 6.4. descriptive statistics of test data are given. In the Figure 6.4 graph of the test data is given.

Table 6.3: Descriptive statistics of ISE XU100 training data

			Statistic	Std. Error
ISEXU100_training	Mean		27735.76	352.41157
	95% Confidence Interval for Mean	Lower Bound	27044.30	
		Upper Bound	28427.21	
	5% Trimmed Mean		27621.06	
	Median		26481.20	
	Variance		1E+008	
	Std. Deviation		11856.96	
	Minimum		8892.65	
	Maximum		52086.70	
	Range		43194.05	
	Interquartile Range		20415.50	
	Skewness		.099	.073
	Kurtosis		-1.302	.145

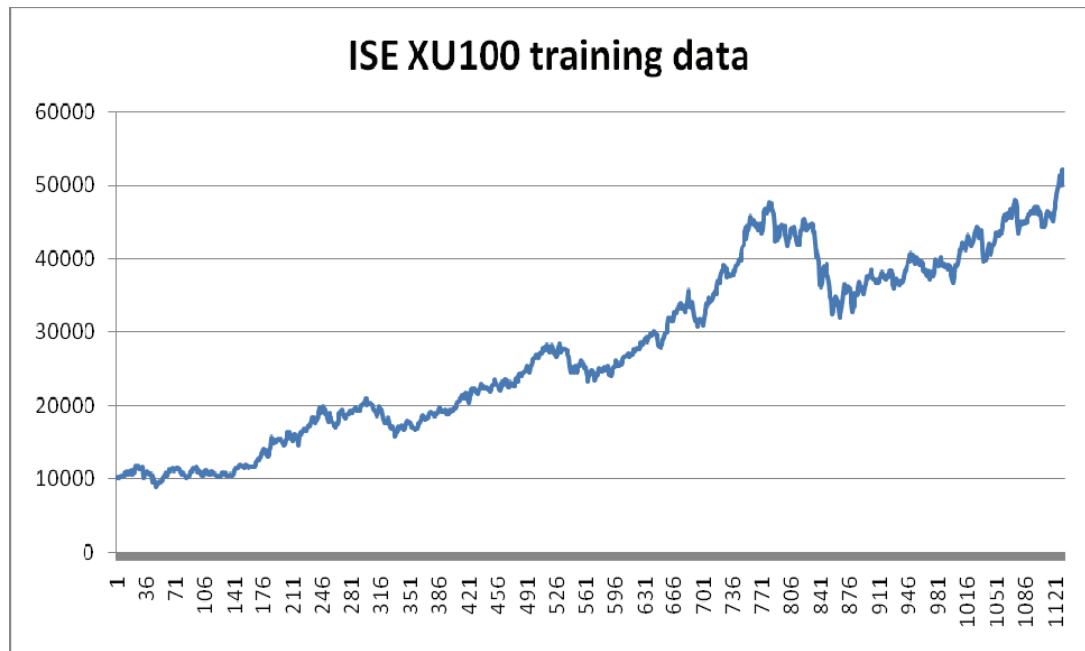


Figure 6.3: ISE XU100 closing values used for training and cross validation

Table 6.4: Descriptive statistics of ISE XU100 test data

			Statistic	Std. Error
ISEXU100_test	Mean		51265.36	349.93147
	95% Confidence Interval for Mean	Lower Bound	50574.25	
		Upper Bound	51956.47	
	5% Trimmed Mean		51394.10	
	Median		52431.70	
	Variance		2E+007	
	Std. Deviation		4426.322	
	Minimum		41342.80	
	Maximum		58231.90	
	Range		16889.10	
	Interquartile Range		7168.50	
	Skewness		-.472	
	Kurtosis		-.932	
				.192
				.381

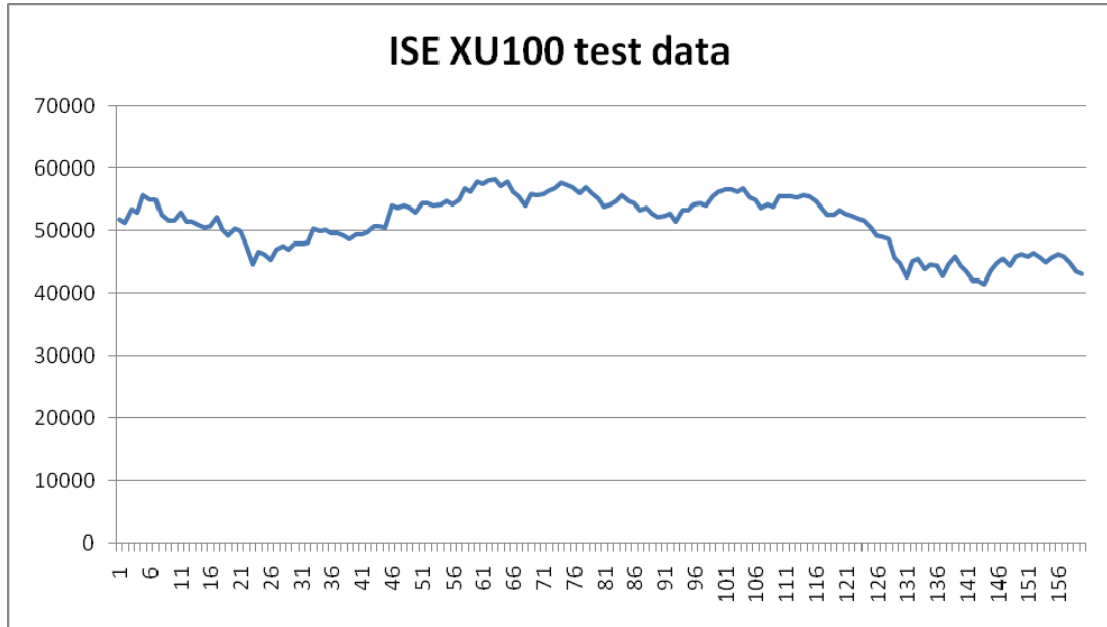


Figure 6.4: ISE XU100 closing values used for testing the models

6.6 Results Achieved

In Table 6.5 the results of the models are given. The training and test results are given with three different error measures. Mean square error (MSE) and mean absolute deviate (MAD) are generally used in literature. In this study another form of MAD is used. MAD % is mean absolute deviate in percentage. When the descriptive statistics is analyzed it is easy to see that training data is between 8892.65 and 52086.70 (range is 43194.05). But the test data is between 41342.80 and 58231.90 (range is 16889.10). Thus to clarify the errors between training and testing, MAD% values are given.

Table 6.5: Results of the neural and hybrid models

	Training			Test		
	MSE	MAD	MAD %	MSE	MAD	MAD %
MLP	332,121.432	431.074	2.02378	5,540,545.887	2,042.031	3.87061
LTS	1,186,965.425	821.3026	5.032989	6,065,276.39	2,008.984	3,803353
RNN	2,215,589.220	1,073.526	6.182388	30,728,867.031	4,748.948	8.847816
DAN2	262,130.482	370.661	1.408297	1,176,015.662	840.700	1.679289
GARCH-MLP	468,823.206	514.225	2.627341	7,124,780.410	2,317.443	4.38835
EGARCH-MLP	450,787.299	512.206	2.705861	8,651,756.488	2,547.234	4.797743
GARCH-LTS	4,793,112.973	1,344.516	7.021188	82,679,183.387	8,259.680	15.56614
EGARCH-LTS	7,268,783.313	1,771.432	9.802969	86,388,074.047	8,383.227	15.77058
GARCH-RNN	1,588,036.667	839.538	4.413098	40,952,240.876	5,621.619	10.52457
EGARCH-RNN	2,331,406.012	806.284	4.545228	46,952,272.147	5,970.485	11.15228
GARCH-DAN2	261,378.620	370.218	1.4039	1,178,820.521	842.373	1.682031
EGARCH-DAN2	261,918.229	370.416	1.405955	1,177,072.296	841.188	1.680164

The following figures are the % training and % testing error deviations of each model. All models training error do not have specific shape. DAN2, GARCH-DAN2 and EGARCH-DAN2 testing errors do not have specific shapes (Figure 6.24, Figure 6.26, and Figure 6.28), but GARCH-LTS, EGARCH-LTS, RNN, GARCH-RNN, EGARCH-RNN (Figure 6.14, Figure 6.16, Figure 6.18, Figure 6.20, and Figure 6.22) clearly have a extended “W” shape and nearly all errors are below 0. MLP based models, which have second least errors after DAN2 models, also have extended “W” shape testing errors (Figure 6.6, Figure 6.8, and Figure 6.10). But MLP, GARCH-MLP, and EGARCH-MLP have close testing error values to 0, which enables having smaller errors than the other w-shapes. LTS in Figure 6.12 also have “W” shape testing errors but both edges have much lower than the others. This w-shape clearly

shows that there are disincluded nonlinear relations. Only DAN2 and DAN2 based hybrid models were able to capture this nonlinearity.

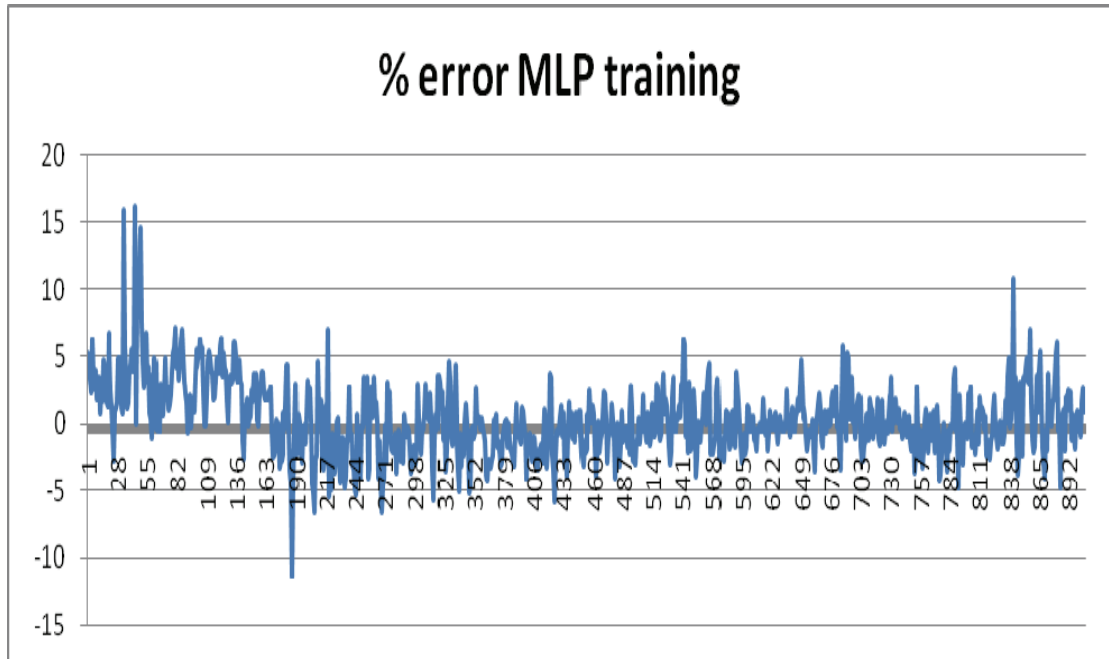


Figure 6.5: Oscillation graph for % training error deviation of MLP model

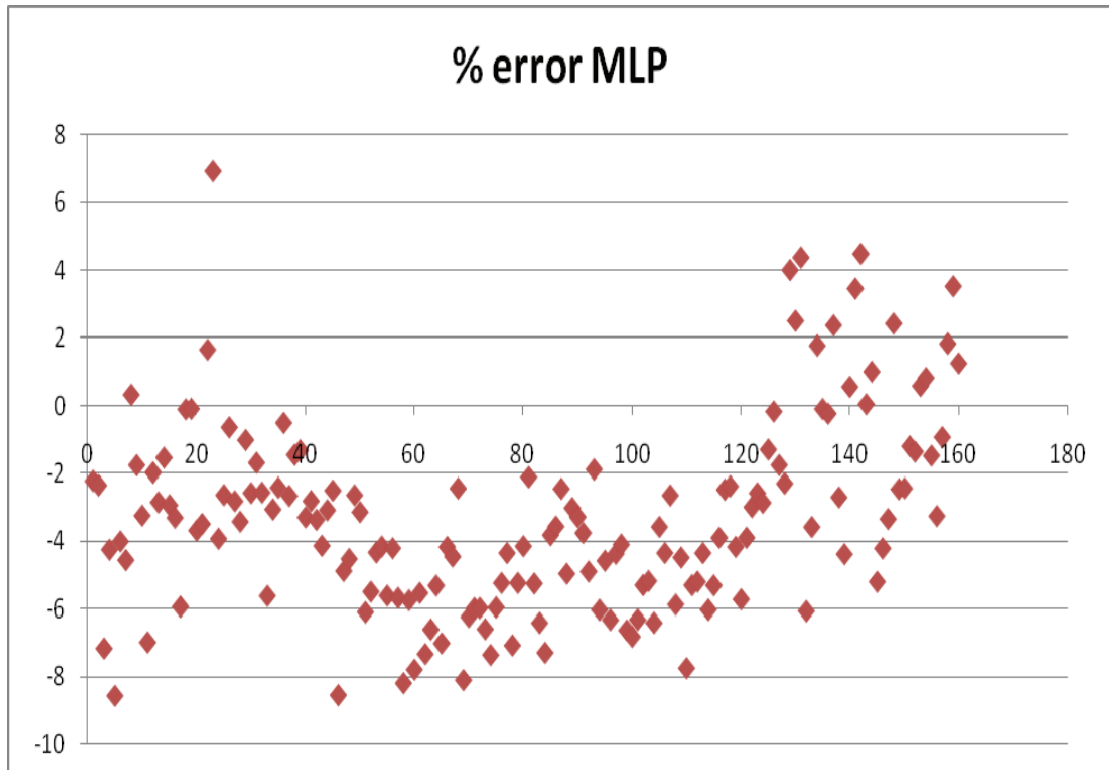


Figure 6.6: Scatter diagram for % testing error deviation of MLP model, it has a “w” shape with close values to 0

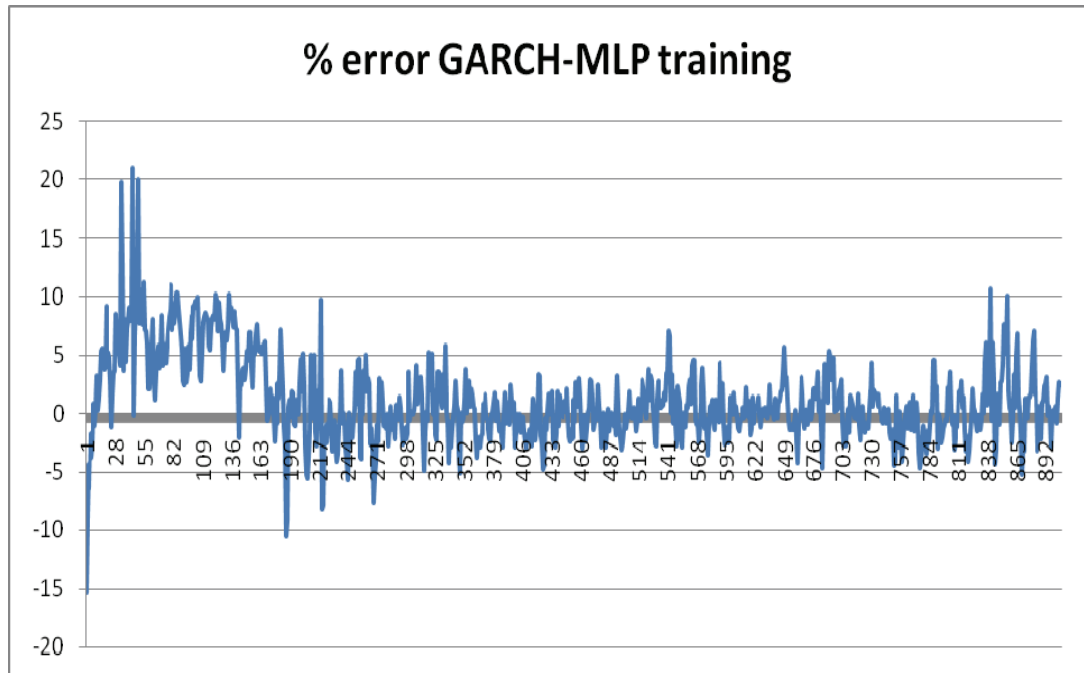


Figure 6.7: Oscillation graph for % training error deviation of GARCH-MLP model

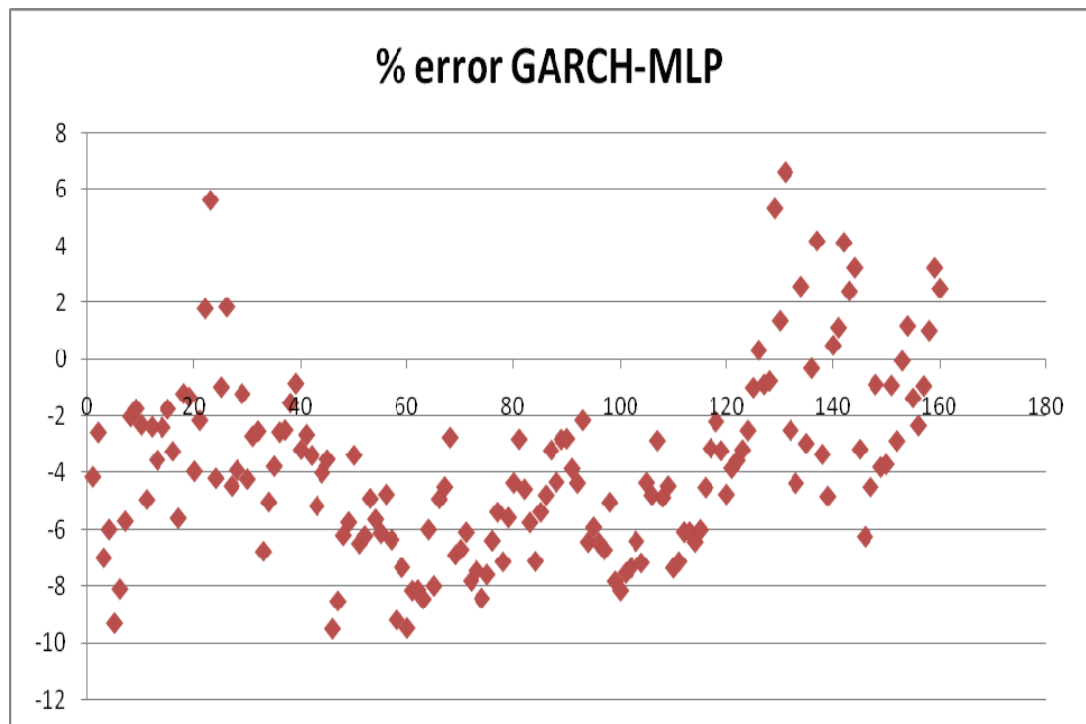


Figure 6.8: Scatter diagram for % testing error deviation of GARCH-MLP model, it has a “w” shape with close values to 0

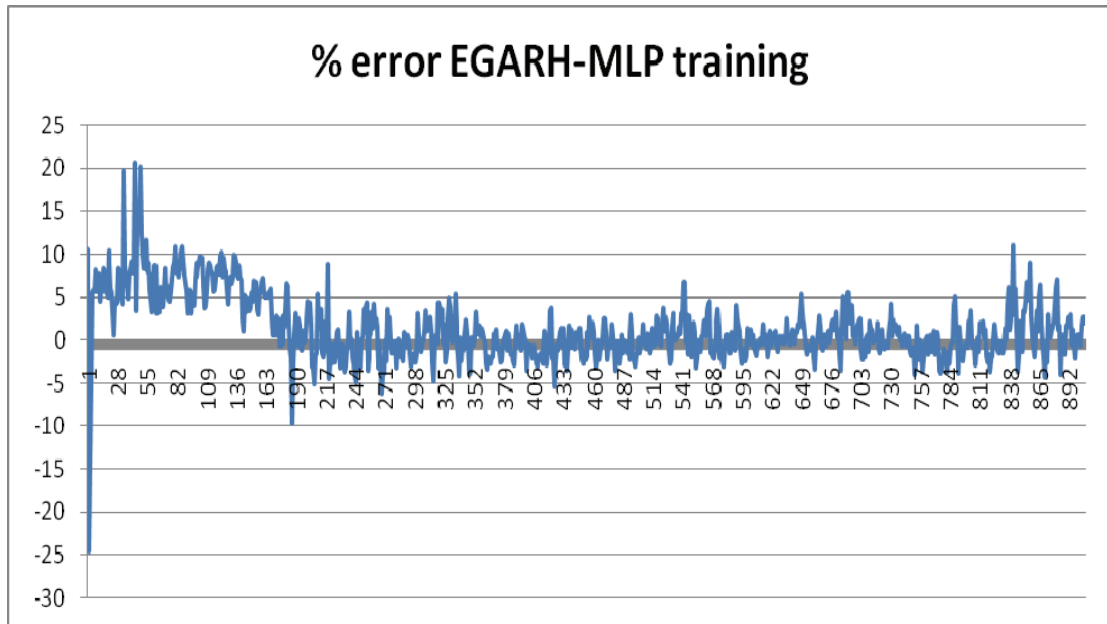


Figure 6.9: Oscillation graph for % training error deviation of EGARCH-MLP model

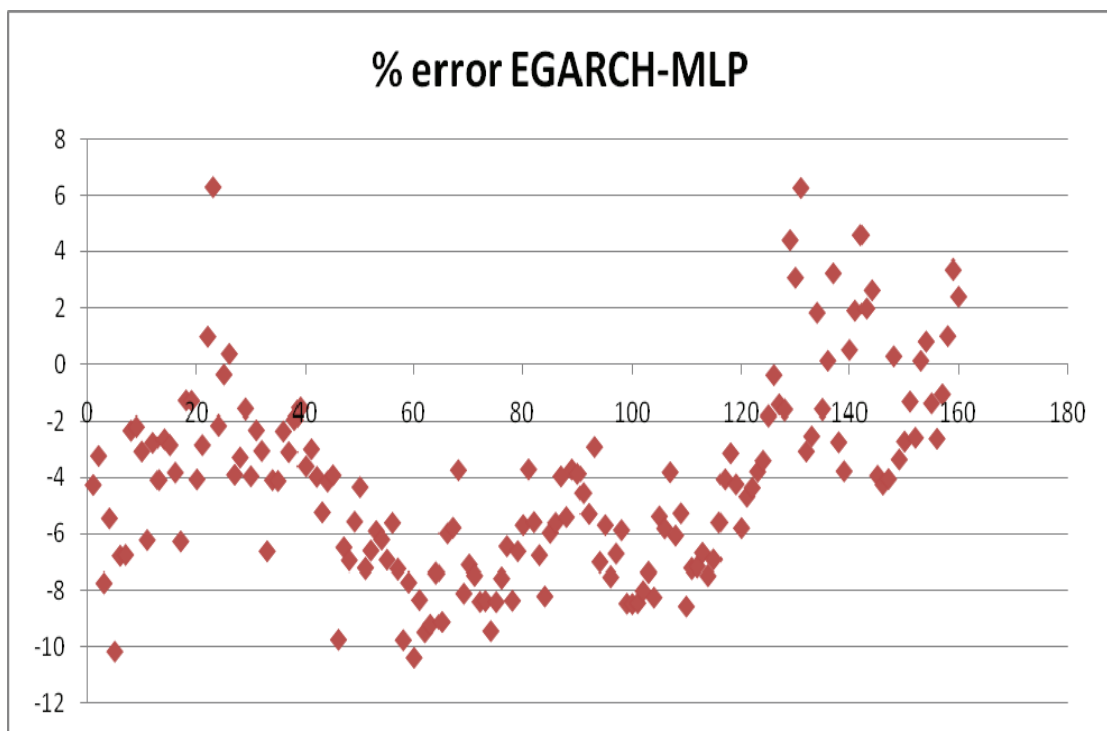


Figure 6.10: Scatter diagram for % testing error deviation of EGARCH-MLP model, it has a “w” shape with close values to 0

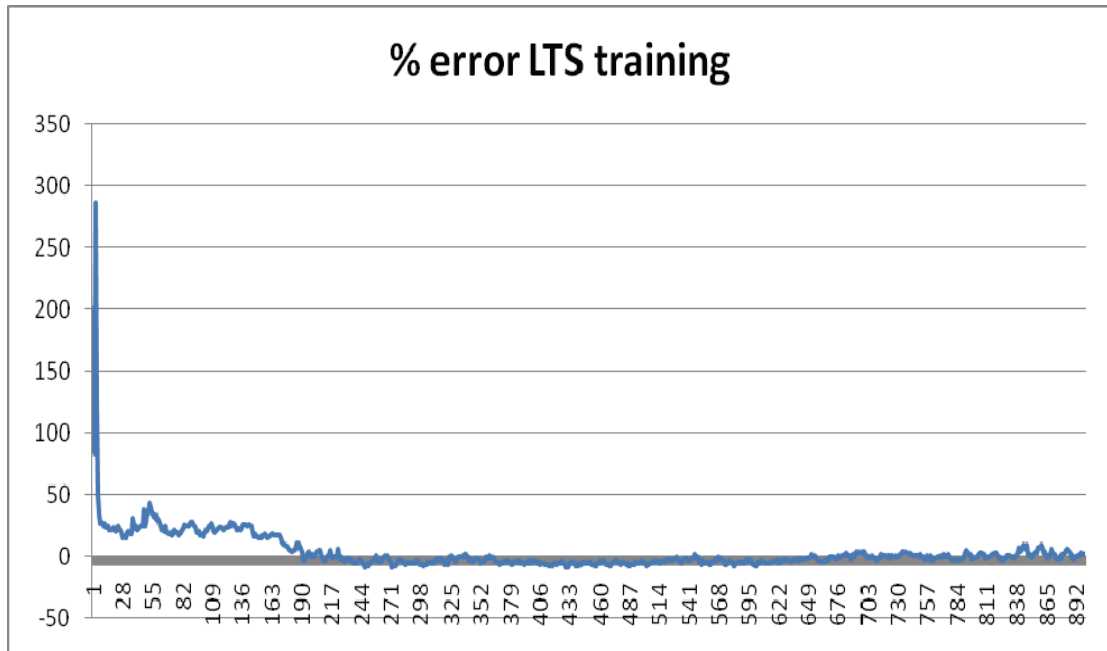


Figure 6.11: Oscillation graph for % training error deviation of LTS model

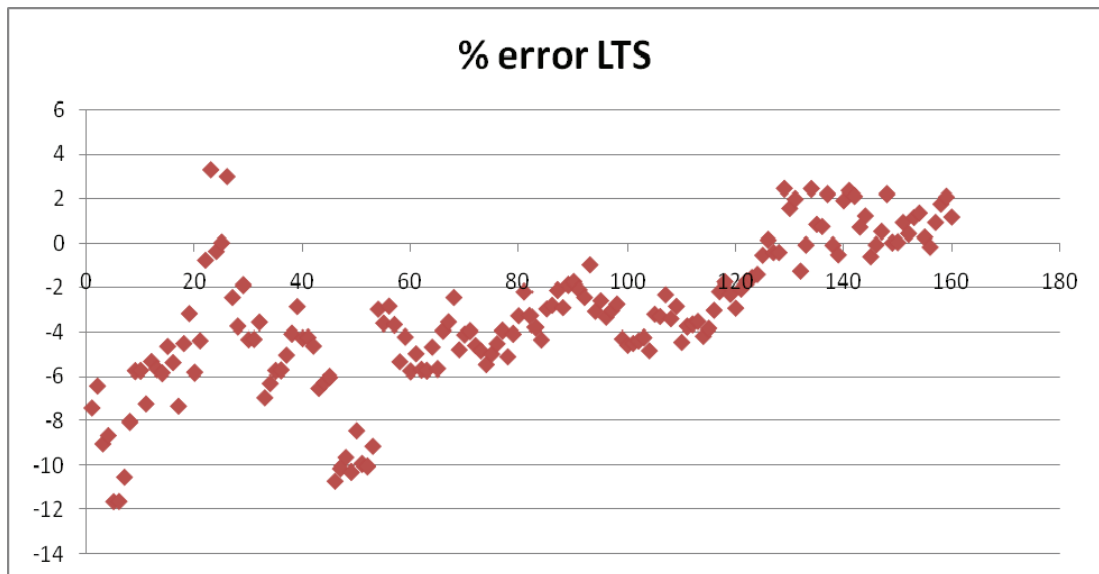


Figure 6.12: Scatter diagram for % testing error deviation of LTS model it has a “w” shape but not very clear

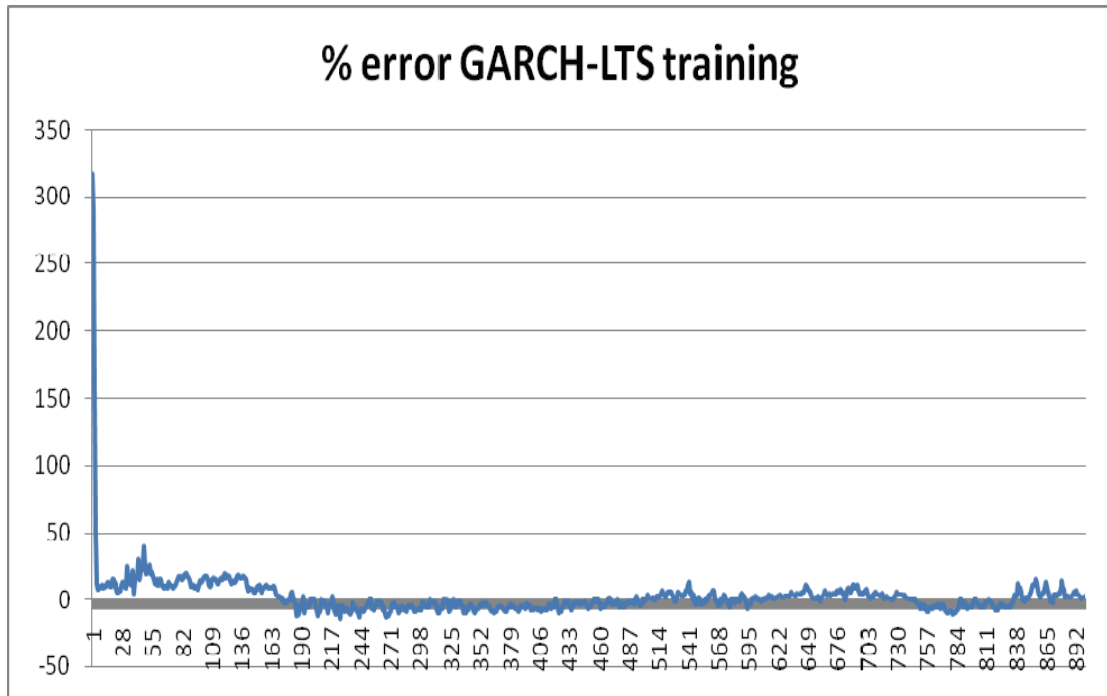


Figure 6.13: Oscillation graph for % training error deviation of GARCH-LTS model

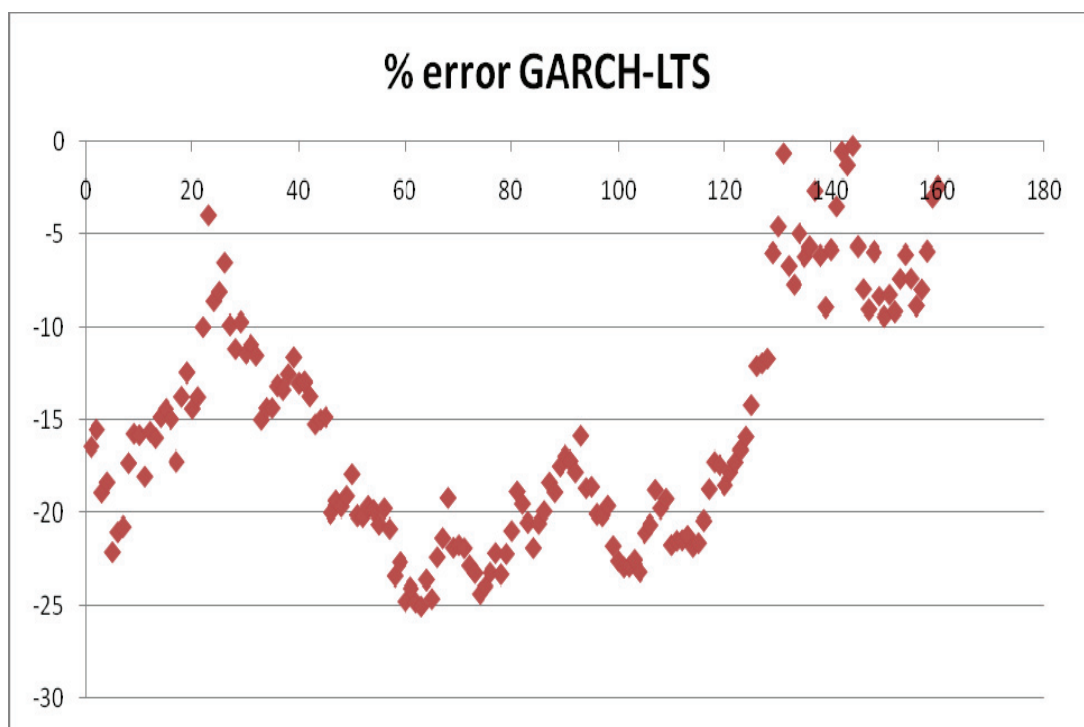


Figure 6.14: Scatter diagram for % testing error deviation of GARCH-LTS model, it has a “w” shape with negative values

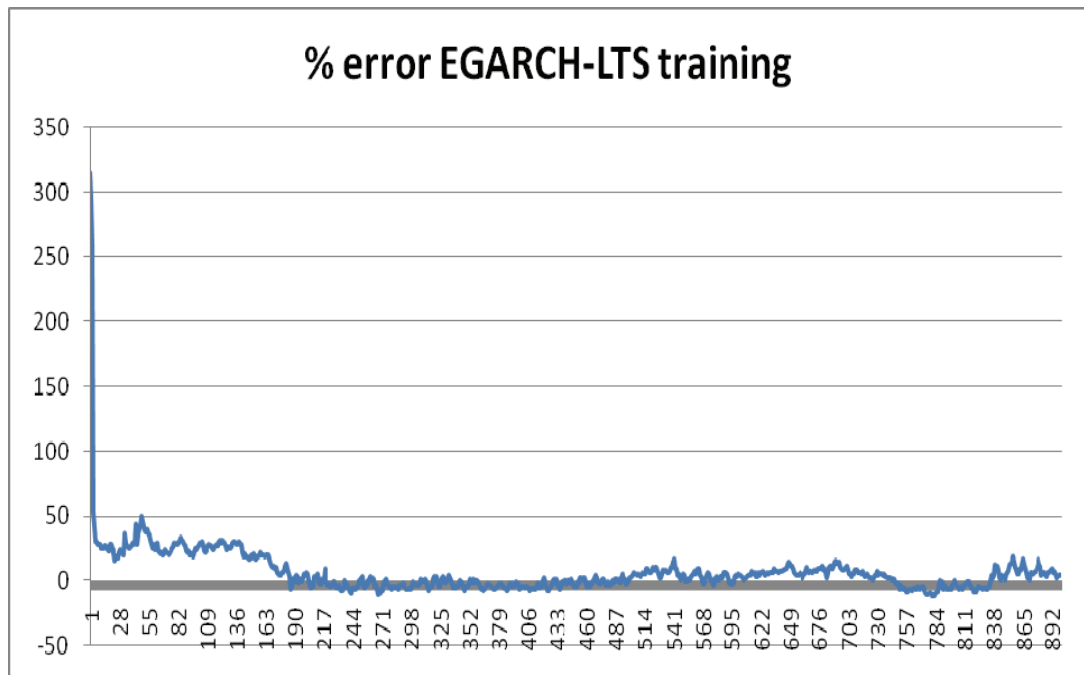


Figure 6.15: Oscillation graph for % training error deviation of EGARCH-LTS model

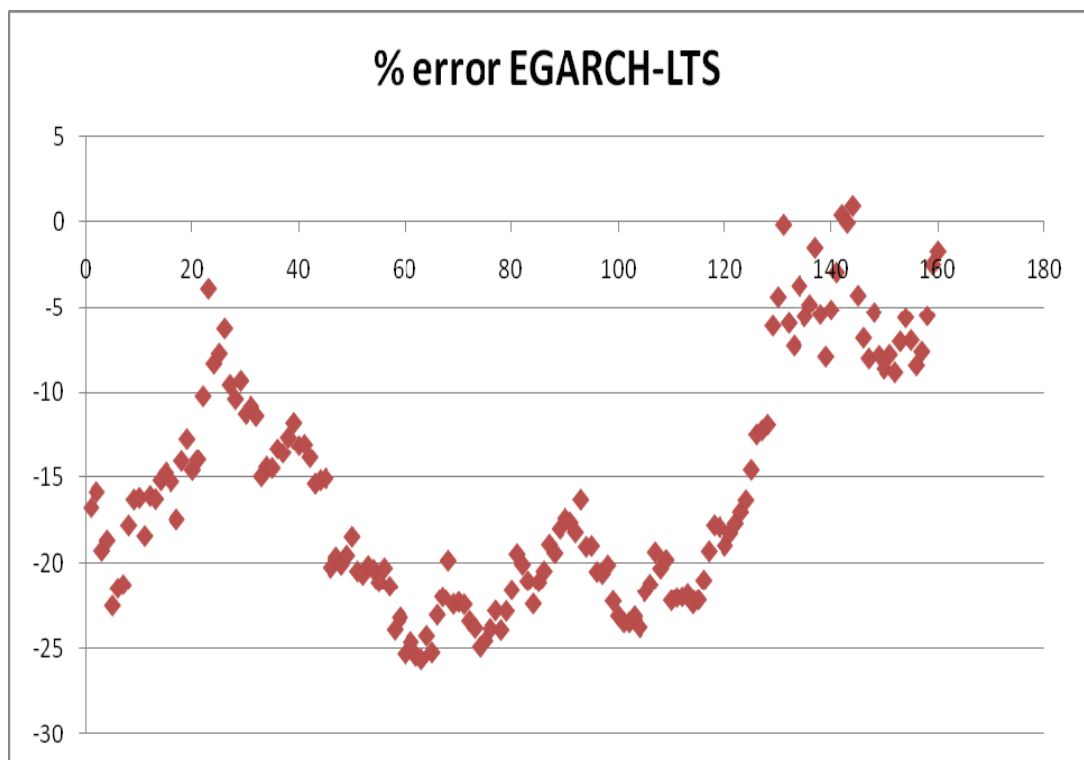


Figure 6.16: Scatter diagram for % testing error deviation of EGARCH-LTS model, it has a “w” shape with negative values

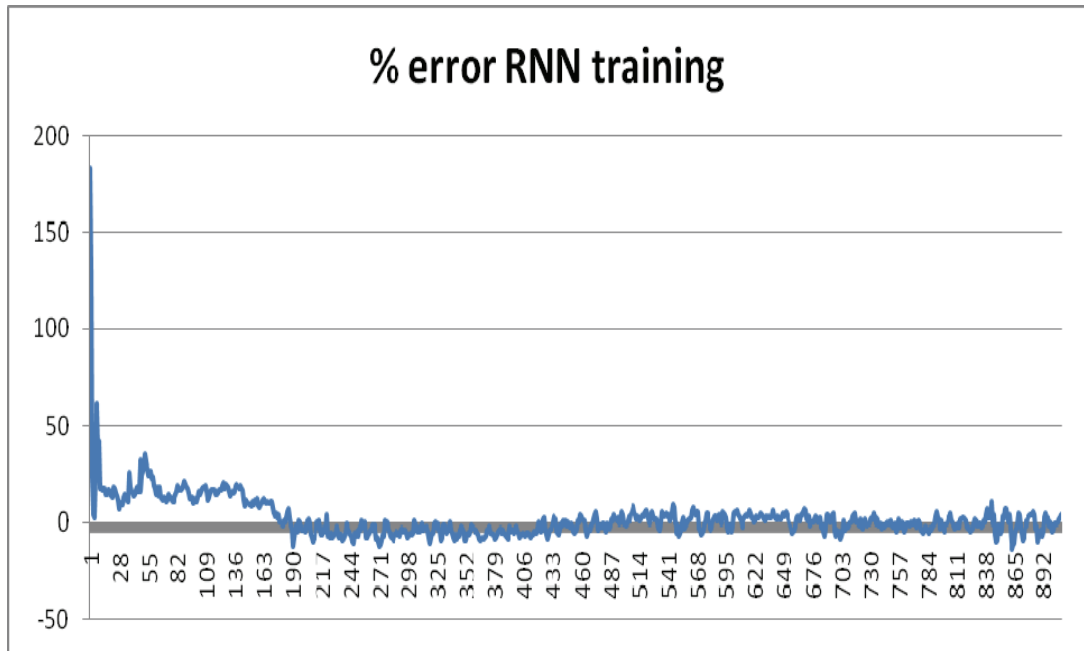


Figure 6.17: Oscillation graph for % training error deviation of RNN model

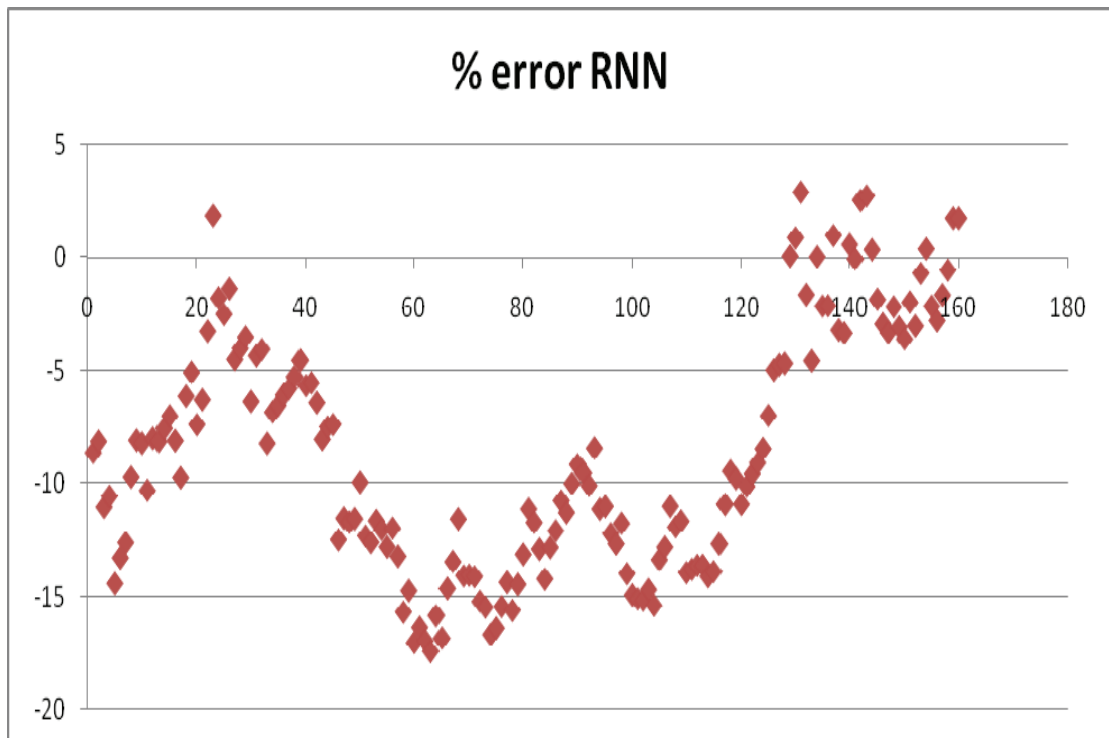


Figure 6.18: Scatter diagram for % testing error deviation of RNN model, it has a “w” shape with negative values

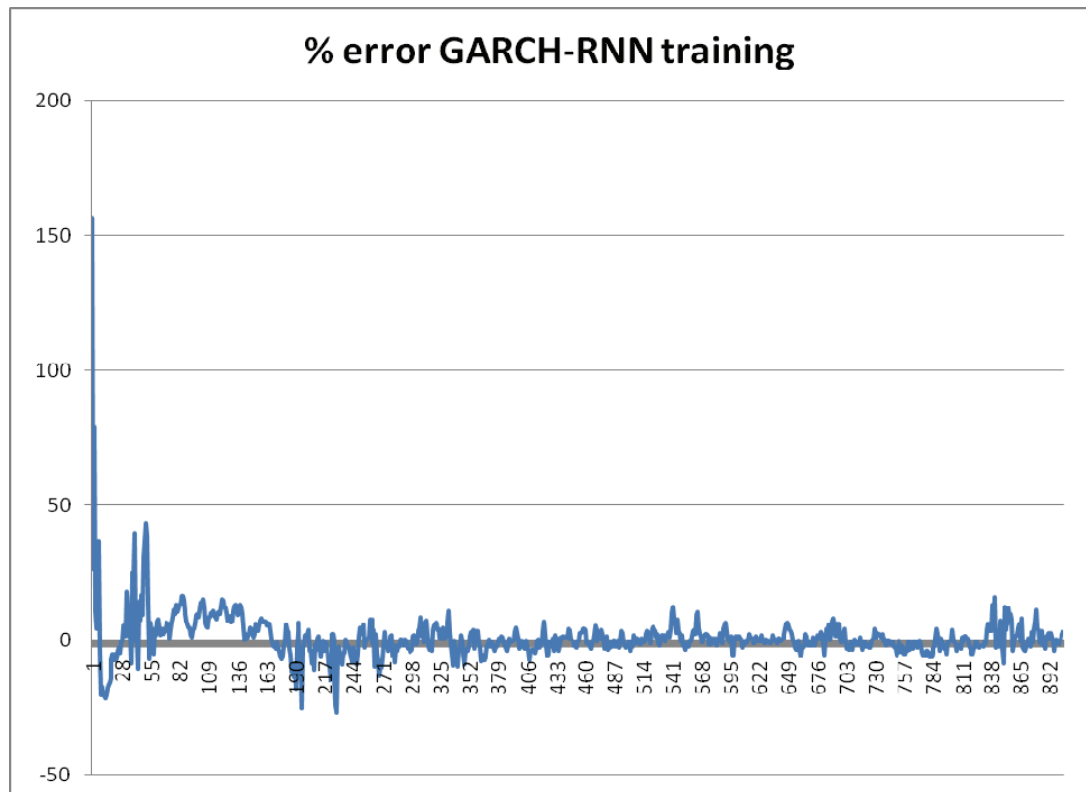


Figure 6.19: Oscillation graph for % training error deviation of GARCH-RNN model

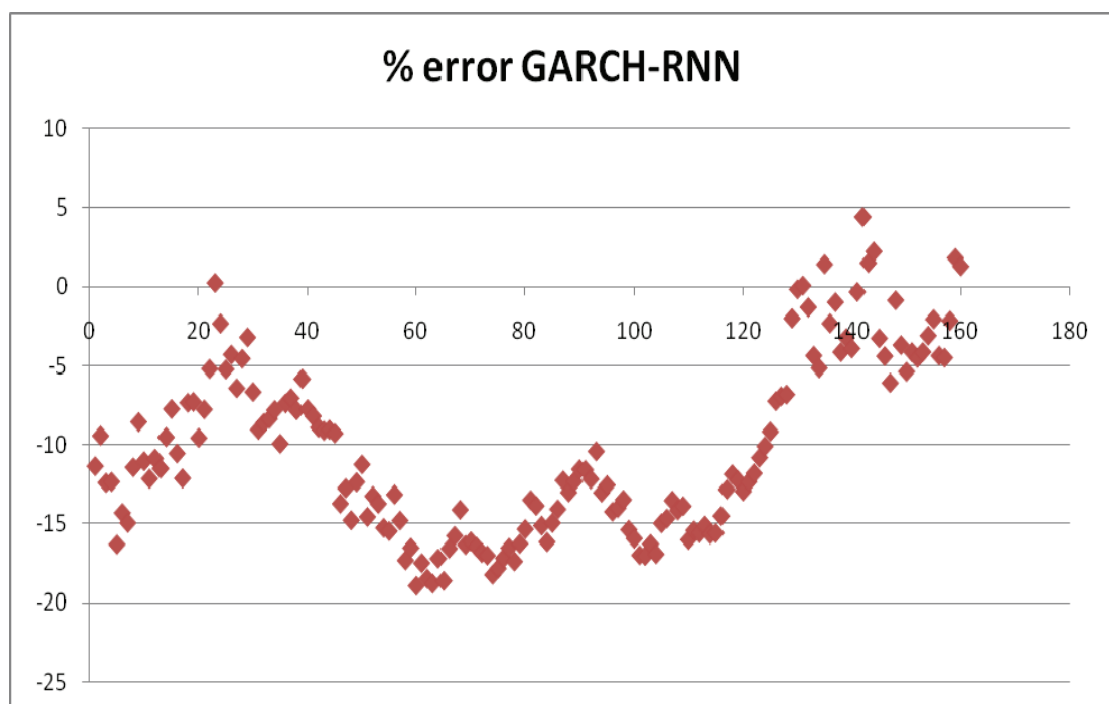


Figure 6.20: Scatter diagram for % testing error deviation of GARCH-RNN model, it has a “w” shape with negative values

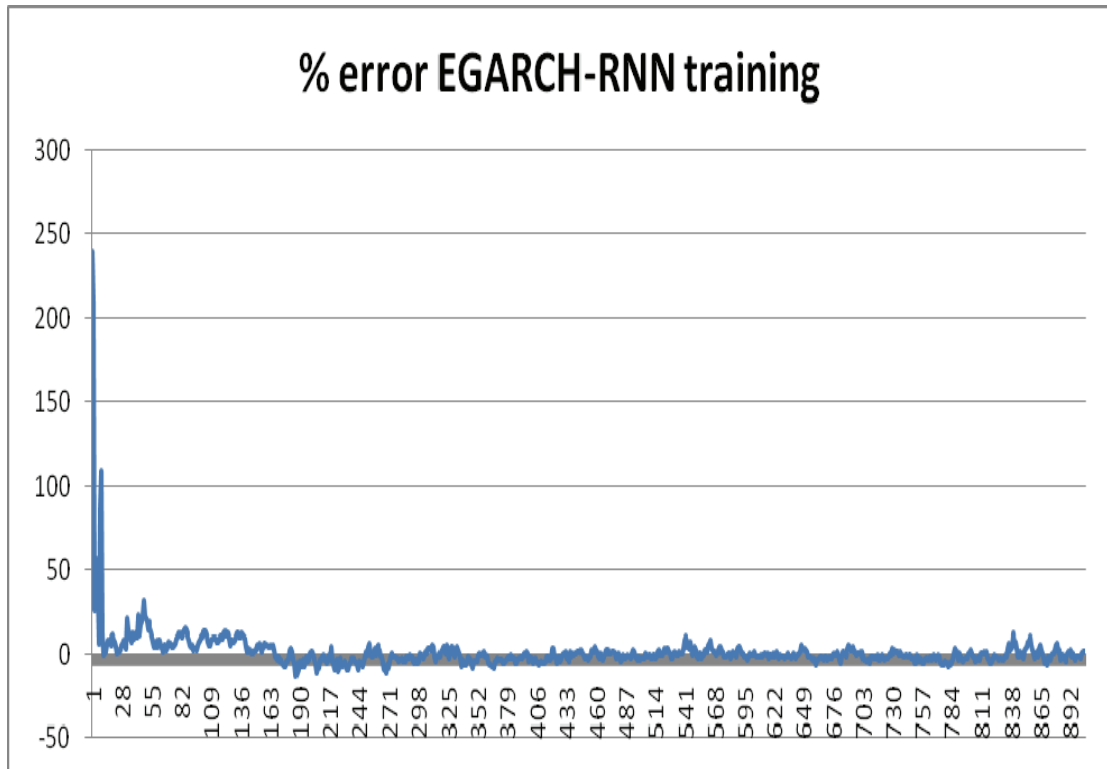


Figure 6.21: Oscillation graph for % training error deviation of EGARCH-RNN model

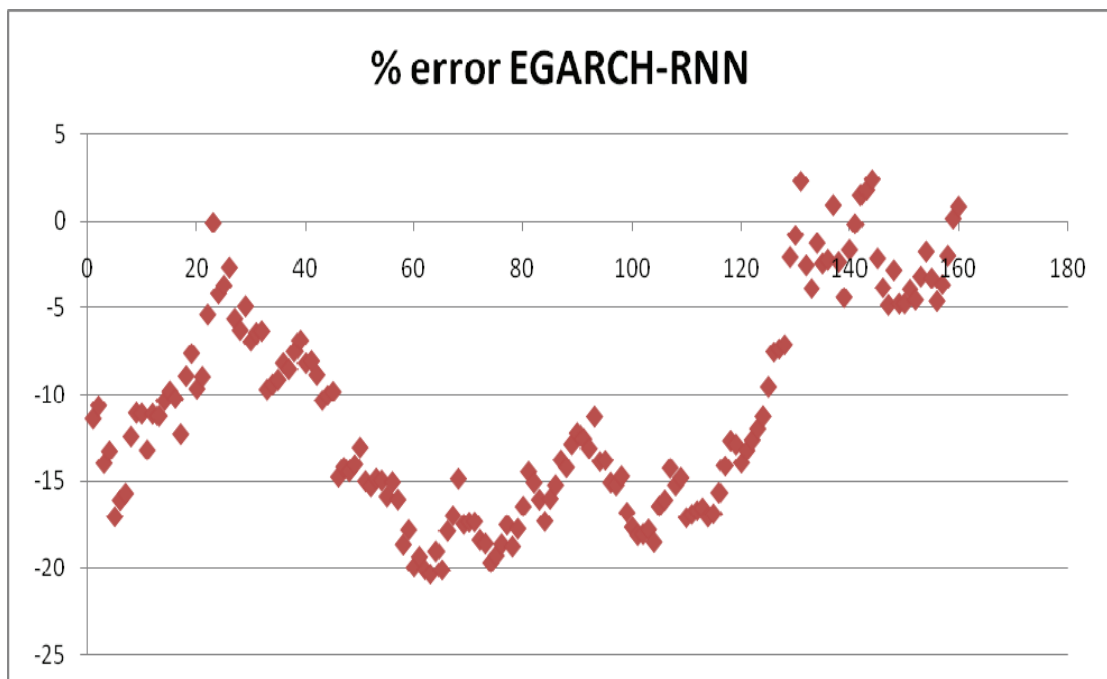


Figure 6.22: Scatter diagram for % testing error deviation of EGARCH-RNN model, it has a “w” shape with negative values

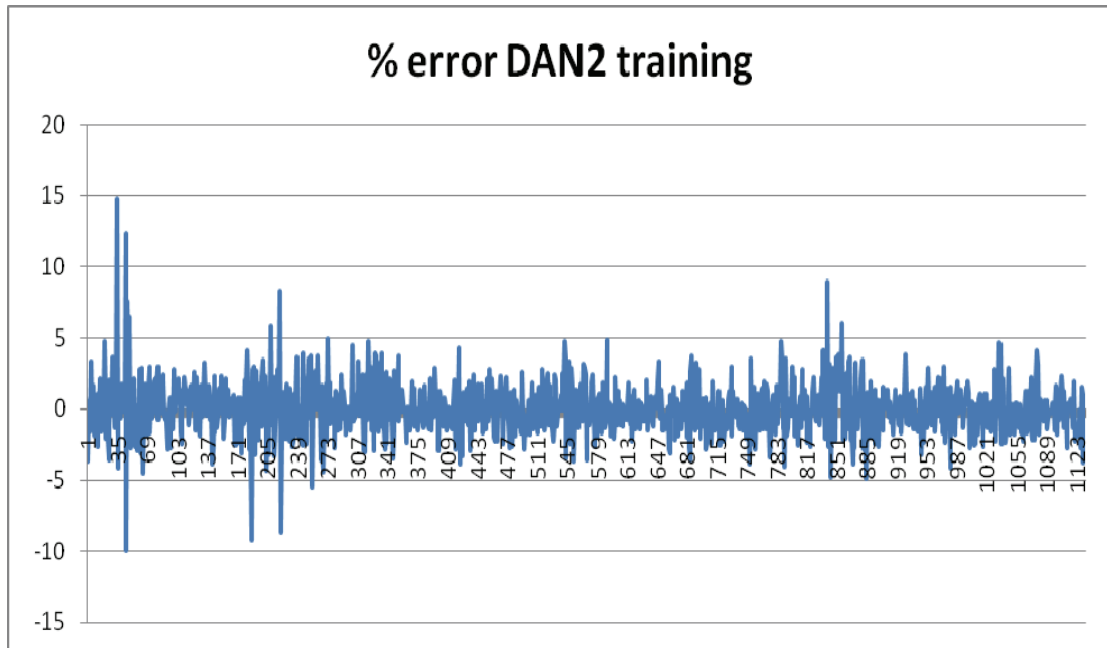


Figure 6.23: Oscillation graph for % training error deviation of DAN2 model

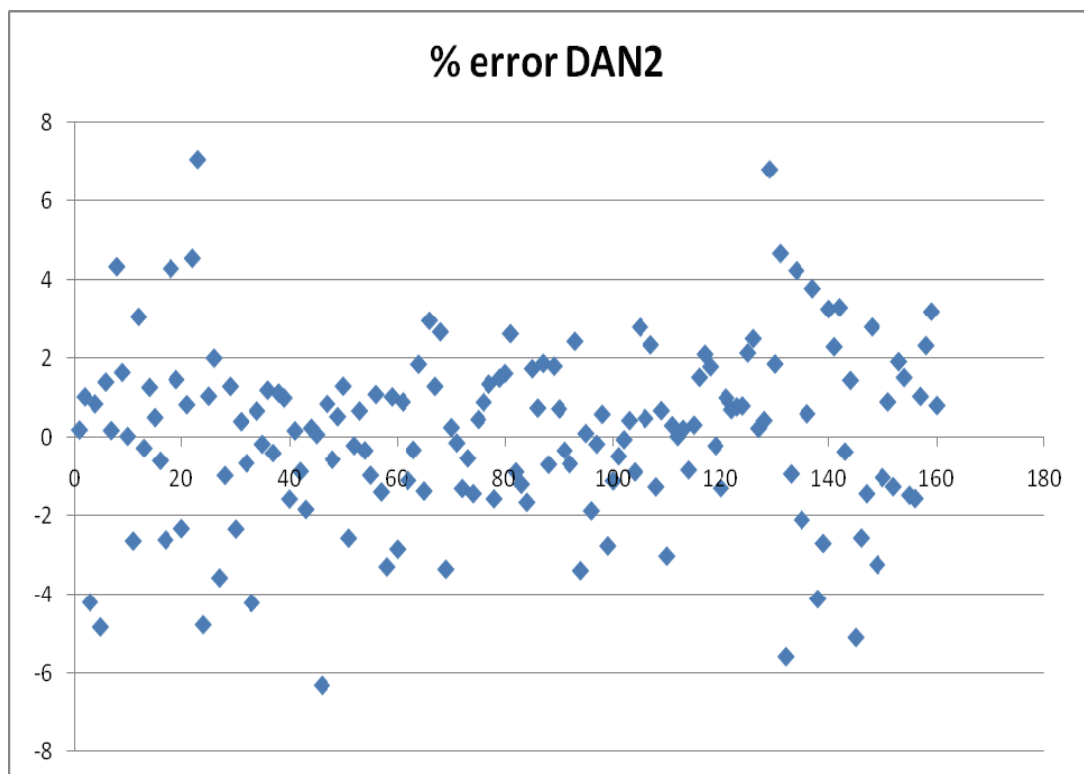


Figure 6.24: Scatter diagram for % testing error deviation of DAN2 model, it has no common shape

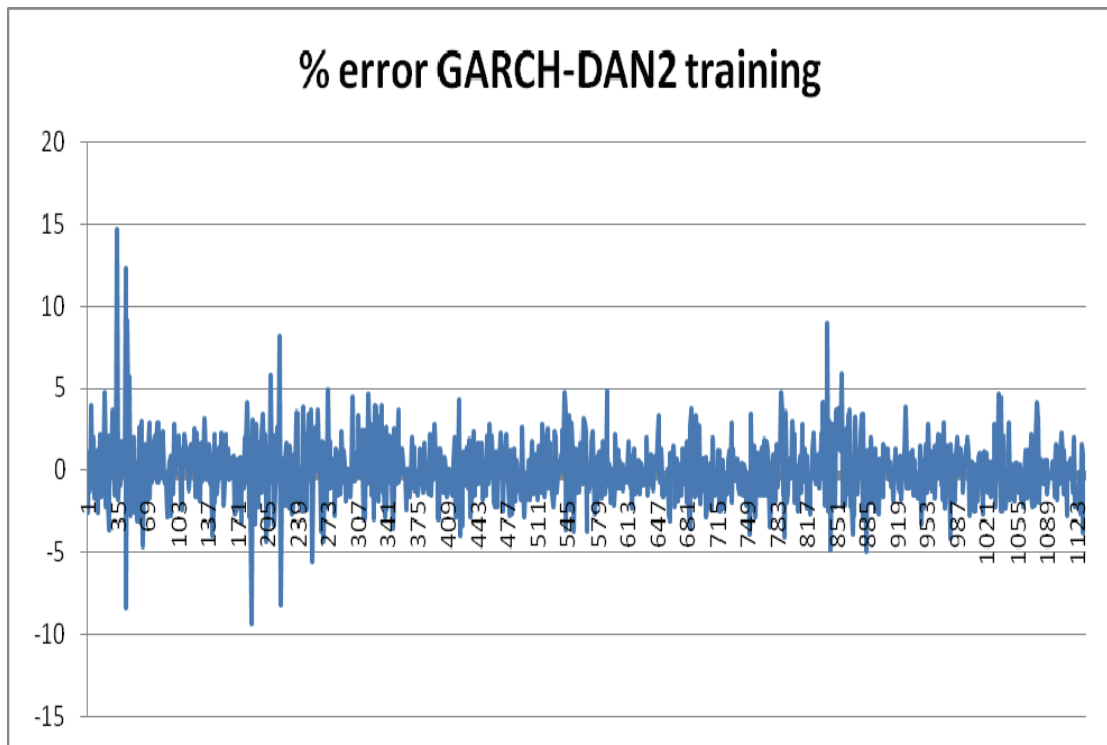


Figure 6.25: Oscillation graph for % training error deviation of GARCH-DAN2 model

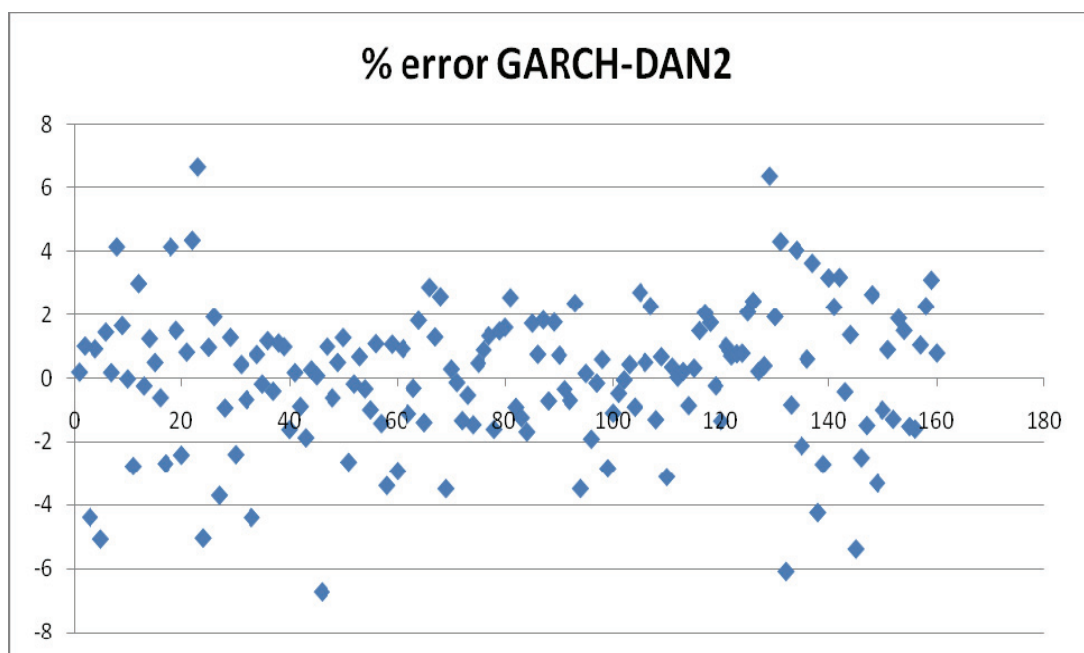


Figure 6.26: Scatter diagram for % testing error deviation of GARCH-DAN2 model, it has no common shape

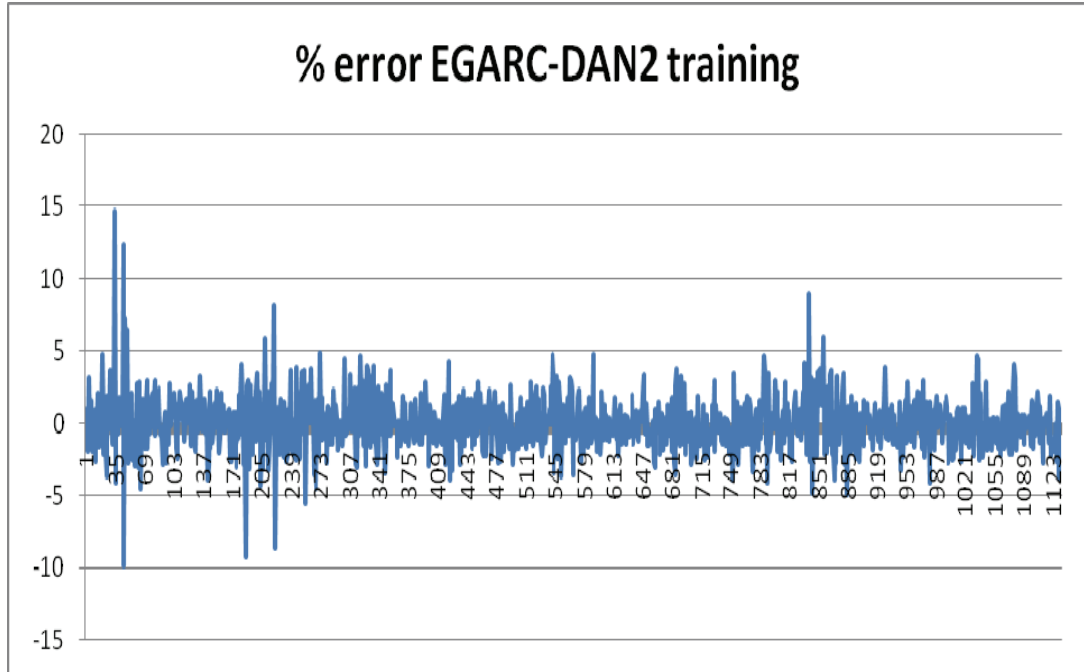


Figure 6.27: Oscillation graph for % training error deviation of EGARCH-DAN2 model

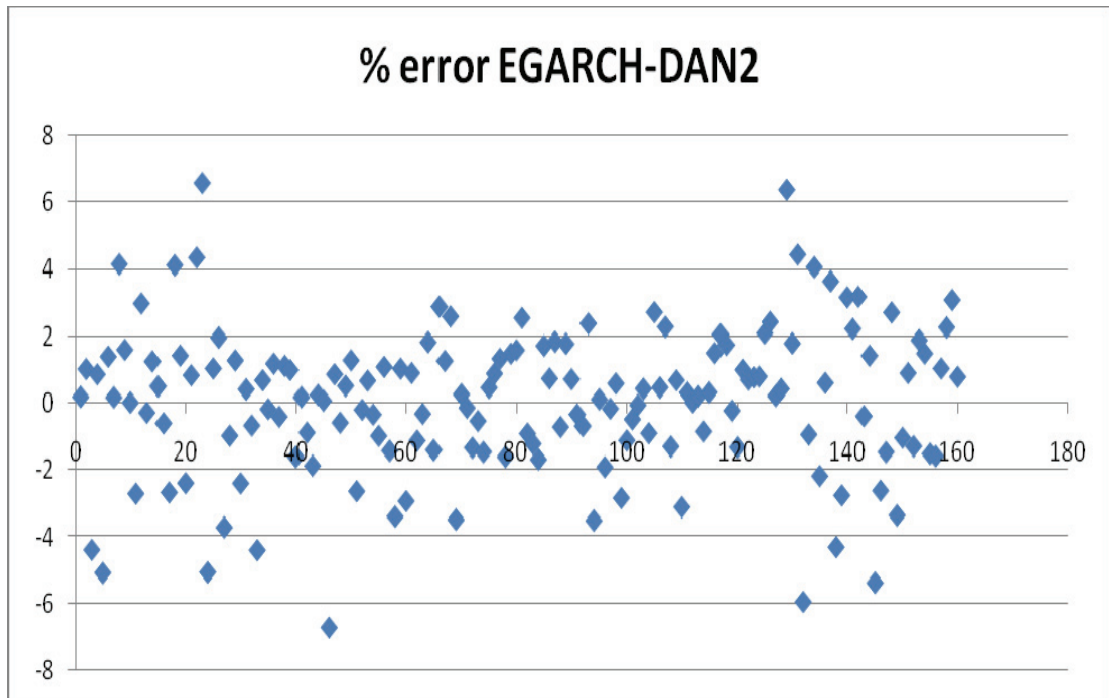


Figure 6.28: Scatter diagram for % testing error deviation of EGARCH-DAN2 model, it has no common shape

GARCH-DAN2 have the smallest training MSE and MAD, followed by EGARCH-DAN2 and DAN2. In all the other hybrid models, training MSE and MAD values are increased when compared to their non-hybrid models. This also shows that DAN2

has greater noise tolerance. However, GARCH-DAN2 and EGARCH-DAN2 have smaller training MSE and MAD, and DAN2 has smaller testing MSE and MAD.

DAN2 based neural networks clearly outperformed the other neural networks. Hybrid RNN models decrease the training error but increase the testing errors. Second best neural network architecture is MLP. MLP and MLP based hybrid model are clearly outperformed the LTS, RNN and their hybrid models. When training errors and testing errors are compared DAN2 has minimum difference (MAD%).

6.7 Evaluating DAN2 Architecture

Since DAN2 algorithm is a new architecture no evaluation is found in literature. All three papers, which use DAN2 architecture, are written by the developers. Thus in the following part, properties and deficiencies of DAN2 architecture is evaluated.

6.7.1 Properties of DAN2

The following properties are reported by developers and observed in this study:

1. Traditionally, input records are processed one at a time but DAN2 uses the entire set of records simultaneously and repeatedly at every layer. This global view of the process provides a training environment that ensures monotonically increasing learning.
2. DAN2 uses the trigonometric cosine function to capture the nonlinearity of the process. Estimation of the nonlinear component is partitioned into successive layers. At each layer the transfer function introduces one nonlinear parameter only (μ_k from Equation 5.14), which is approximately or experimentally determined. This partitioning reduces solution complexity for each layer, while maintaining the acquired knowledge from previous layers.
3. In traditional neural networks, the number of hidden layers and number of neurons in each layer is experimentally determined. In DAN2 the number of neurons at each hidden layer is fixed at four. The model determines the number of hidden layers dynamically to achieve specified performance criteria. Model structure selection is major challenge for ANN researchers. Traditional neural networks require the modeller to define and determine the right input variables, correct number

of layers, optimal number of neurons in each hidden layer, correct learning rate and correct starting weights. DAN2 reduces this challenge to only one decision: the selection of input variables. Once inputs are selected, DAN2 minimizes a measure of network performance (SSE or MSE) by introducing hidden layers dynamically. There is no learning rate selection or correct starting weights selection problem because DAN2 uses linear regression to calculate the output of each layer and captures as remaining nonlinearity as much as it can. Shortly there is no need to use such an algorithm like genetic algorithm to search optimized parameters.

4. Network connectivity in traditional ANN uses many-to-many relationship among in hidden neurons. This connectivity requires many arcs, which can result in a complex architecture. DAN2 architecture reduces this complexity by allowing many-to-one relationships only.
5. Since each layer uses four nodes and has fewer arcs, the computational requirements at each layer are reduced so DAN2 has a faster computing speed than other NN models.
6. DAN2 has a greater noise tolerance than the other NN models.
7. In all studies DAN2 clearly outperforms all other NN models.
8. In extracting nonlinear relations from data, DAN2 is better than the other NN models.
9. DAN2 uses α_i values, the angle between observed vector and the reference vector, to train the network, which reduces memory requirements of the algorithm.

6.7.2 Deficiencies of DAN2

The following deficiencies and negative properties are found during this study:

1. Since DAN2 is a new architecture and only studied by its developers, some parts of the architecture are not clear enough. One of them is the α_i , the angle between observed vector and the reference vector, is updated at each layer but the updating process is not mentioned. Another one is the μ_k from Equation 5.14. Ghiassi and Saidane (2005) evaluated calculation methods of the non-linear element μ_k from Equation 5.14. They use bisection method which finds approximate value of μ_k for SSE_k . In this study all approximate μ_k values, obtained from the suggested function

using bisection method, are very close to the first starting μ_k values. These problems do not affect this study, since all DAN2 based models stopped at first hidden layer because of the increasing cross validation error.

2. DAN2 algorithm starts with a special layer (node) to capture the linearity of data. For this linearity classical linear regression is used. In linear regression, variables with insignificant coefficient are removed from the model and the coefficients are recalculated. An input can be correlated with the output but can be removed from the linear regression model because of the multicollinearity. When the papers are reviewed, it is observed that the insignificant variables are not removed. For some of the time series, used in those papers, the first linear node is calculated and seen that some of the variables must be removed but the developers didn't mention about removing their inputs. This is an important defect, since unremoved insignificant inputs will have coefficients with errors. If the inputs are removed because of the multicollinearity problem, DAN2 algorithm becomes a statistical tool rather than neural network architecture. This input elimination contradicts with the most important property of neural networks: *Input-Output Mapping* and *Contextual Information*. The artificial neural networks should have the critical ability to use any input without considering the multicollinearity.

3. The same significance problem can be seen in the hidden layers. In each subsequent layer DAN2 uses previous layer's CAKE, CURNOLE and C nodes weighted sum (linear combination) as the input of the current layer's CAKE node which carries an adequate portion of learning achieved in previous layer to the next layer. Again the DAN2 developers didn't mention about removing the insignificant variable (nodes or neuron connections). Removal, based on insignificance, would have caused the dynamism in DAN2 architecture. Besides, learning algorithm will be dynamically removing the unnecessary connections. But if the insignificant variables are not removed the zero coefficients will have non-zero values and the other coefficients will contain calculation errors. The following tables are obtained from SPSS software to calculate the significance. The Table 6.6 and Table 6.7 are obtained while calculating DAN2 hidden layers. In the first table constant (C node), G and H nodes are insignificant and have unacceptable coefficients. The constant is twice bigger than the maximum value in data set and H node has a negative value close to the constant. In this layer both training and cross validation error were

decreasing. This clearly shows that the significance of each coefficient should be calculated and insignificant connections should be removed.

Table 6.6: Linear regression significance values of a hidden layer, obtained from SPSS software

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	142617.4	478187.3		.298	.766
CAKE node	.730	.002	.998	333.318	.000
G node	-48694.0	238915.3	-.035	-.204	.839
H node	-136521	414278.1	-.057	-.330	.742

Table 6.7: Linear regression significance values of a hidden layer, obtained from SPSS software

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	39134.685	44956.227		.871	.384
CAKE node	1.000	.001	.999	1161.175	.000
G node	-39118.7	44936.097	-.002	-.871	.384
H node	-1328.327	1777.376	-.001	-.747	.455

4. Another important deficiency of DAN2 is the *Adaptivity* property of neural networks. DAN2 uses the entire set of records simultaneously and repeatedly at every layer but this causes adaptivity problem. If the environment changes, i.e. a few days pass and new index values are available, the changes must be added to data and DAN2 should be retrained, which is the same with creating a new DAN2 model because of the linear regression. But the neural networks have adaptivity property which avoids retraining for introduction of every new data.

5. DAN2 uses linear regression in each layer and this causes only one output for each network. Since linear regression can only calculate one dependent variable, for each additional output a new DAN2 network is needed.

The majority of the deficiencies, mentioned above, are mailed to the DAN2 developers to discuss the architecture. So far two e-mails are sent and no response is yet received.

7. CONCLUSION AND RECOMMENDATIONS

This study is in search for reducing the shortcomings of using ANN in predicting the market values. With this aim Hybrid models are developed and investigated. In order to present the differences in accuracy of prediction, all the models are applied on the same set of data retrieved from Istanbul Stock Exchange. The comparison for each model is done in two view points: MSE and MAD using real exchange daily rate values of Istanbul Stock Exchange (ISE) official main index XU100. To make easy comparison of training and testing performance of the models, MAD % values are used.

This study shows that DAN2 is powerful neural network architecture. Hybrid models using GARCH and EGARCH can decrease the training error but do not guarantee the decrease in testing errors. The lowest error is achieved by DAN2 based hybrid model, which also shows that DAN2 has greater noise tolerance. All hybrid models, except DAN2 based models, increases the testing error.

When the error deviations of the models are analyzed, only DAN2 and DAN2 based hybrid models were able to capture whole nonlinearity. DAN2 also have many computational and architectural advantages when compared to the other ANN methodologies. In spite of all this advantages DAN2 has fundamental problems about its architecture. DAN2 contradicts with neural networks most important properties of *Input-Output Mapping*, *Contextual Information* and *Adaptivity*. For this reason DAN2 is a statistical tool rather than an artificial neural network. DAN2 is a dynamic architecture, which automatically adds hidden layers and constructs the network, but not dynamic output producer, which can not adapt changes in environment.

The achieved results indicate that DAN2 model is to be focused in the future studies to improve *Input-Output Mapping*, *Contextual Information* properties and to gain *Adaptivity* property. If these deficiencies are eliminated DAN2 will be a powerful

ANN methodology. More attention is to be given to the hybrid models in defining the hybridization procedure clearly.

REFERENCES

- Alpaydın, E.**, 2004. Introduction To Machine Learning, The MIT Press, London, England.
- Bollerslev, T.**, 1986. Generalized autoregressive conditional heteroscedasticity, *Journal of Econometrics*, **31**, 307-327.
- Celik, A.E., Karatepe, Y.**, 2007. Evaluating and forecasting banking crises through neural network models: An application for Turkish banking sector, *Expert systems with Applications*, **33**, 809-815.
- Çınar, D.**, 2007. Hidroelektrik Enerji Üretiminin Hibrid Bir Model İle Tahmini, *Master Thesis*, ITU Institute of Science and Technology, İstanbul.
- Engle, R.F.**, 1982. Autoregressive conditional heteroscedasticity with estimator of variance of United Kingdom inflation, *Econometrica*, **50(4)**, 987-1008.
- Ghiassi, M., Saidane, H.**, 2005. A dynamic architecture for artificial neural networks, *Neurocomputing*, **63**, 397-413.
- Ghiassi, M., Zimbra, D.K., Saidane, H.**, 2006. Medium term system load forecasting with dynamic artificial neural network model, *Electric Power Systems Research*, **76**, 302-316.
- Ghiassi, M., Saidane, H., Zimbra, D.K.**, 2005. A dynamic artificial neural network model for forecasting time series events, *International Journal of Forecasting*, **21**, 341-362.
- Gooijer, J.G.D., Hyndman, R.J.**, 2006. 25 years of time series forecasting, *International Journal of Forecasting*, **22**, 443-473.
- Hassan, M.R., Nath, B., Kirley, M.**, 2007. A fusion model of HMM, ANN and GA for stock market forecasting, *Expert Systems with Applications*, **33**, 171-180.
- Haykin, S.**, 1999. Neural Networks: A Comprehensive Foundation, Prentice Hall, New Jersey, USA.
- Kumar, P.R., Ravi, V.**, 2007. Bankruptcy prediction in banks and firms via statistical and intelligent techniques – A review, *European Journal of Operational Research*, **180**, 1-28.
- Menezes, L.M.**, 2006. Forecasting with genetically programmed polynomial neural networks, *International Journal of Forecasting*, **22**, 249-265.
- Mcnelis, P.D.**, 2005. Neural Networks in Finance: Gaining Predictive Edge in the Market, Elsevier Academic Press, USA.
- Nelson, D.B.**, 1991. Conditional heterosdasticity in asset returns: a new approach, *Econometrica*, **59(2)**, 347-370.

Kosko, B., 1992. Neural Networks and Fuzzy Systems, Prentice-Hall International Editions, USA.

Pekkaya, M., Hamzaçebi, C., 2007. Yapay sinir ağları ile döviz kuru tahmini üzerine bir uygulama, *27. Ulusal YA/EM Kongresi*, İzmir, 973-978.

Preminger, A., Raphael, F., 2007. Forecasting exchange rates: A robust regression approach, *International Journal of Forecasting*, **23**, 71-84.

Principe, J.C., Euliano, N.R., Lefebvre, W.C., 1999. Neural and Adaptive Systems: Fundamentals Through Simulations, John Wiley & Sons, New York, USA.

Roh, T.H., 2007. Forecasting the volatility of stock price index, *Expert Systems with Applications*, **33**, 916-922.

Tosun, S., 2007. Sınıflandırmada Yapay Sinir Ağları ve Veri Madenciliği Karşılaştırması: Öğrenci Başarıları Üzerine Bir Uygulama, *Master Thesis*, ITU Institute of Science and Technology, İstanbul.

Url-1 <<http://en.wikipedia.org/wiki/GARCH>>, accessed at 03.02.2008.

Url-2 <http://en.wikipedia.org/wiki/Market_value>, accessed at 28.04.2008.

Url-3 <<http://www.ise.org/>>, accessed at 28.04.2008.

Yanık, S., Şenel, K., 2007. Finansal Yönetim, Sermaye Piyasası Faaliyetleri İleri Düzey Lisansı Eğitimi Notları, TSPAKB yayınları, İstanbul.

Zhang, Y., Wan, X., 2007. Statistical fuzzy interval neural networks for currency exchange rate time series prediction, *Applied Soft Computing*, **7**, 1149-1156.

APPENDIXES

APPENDIX_A

DATA USED FOR TRAINING, CROSSVALIDATION AND TEST

Training &

CV Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
1	10161,20	9752,86	10357,30	10837,50	10598,60
2	10225,80	10161,20	9752,86	10357,30	10837,50
3	10204,10	10225,80	10161,20	9752,86	10357,30
4	10412,70	10204,10	10225,80	10161,20	9752,86
5	10124,90	10412,70	10204,10	10225,80	10161,20
6	10280,70	10124,90	10412,70	10204,10	10225,80
7	10467,90	10280,70	10124,90	10412,70	10204,10
8	10348,30	10467,90	10280,70	10124,90	10412,70
9	10590,30	10348,30	10467,90	10280,70	10124,90
10	10570,40	10590,30	10348,30	10467,90	10280,70
11	10544,70	10570,40	10590,30	10348,30	10467,90
12	10881,90	10544,70	10570,40	10590,30	10348,30
13	10825,90	10881,90	10544,70	10570,40	10590,30
14	10931,10	10825,90	10881,90	10544,70	10570,40
15	10742,90	10931,10	10825,90	10881,90	10544,70
16	10725,70	10742,90	10931,10	10825,90	10881,90
17	10945,70	10725,70	10742,90	10931,10	10825,90
18	11032,00	10945,70	10725,70	10742,90	10931,10
19	11122,00	11032,00	10945,70	10725,70	10742,90
20	10658,30	11122,00	11032,00	10945,70	10725,70
21	10659,90	10658,30	11122,00	11032,00	10945,70
22	10921,80	10659,90	10658,30	11122,00	11032,00
23	11013,80	10921,80	10659,90	10658,30	11122,00
24	11302,50	11013,80	10921,80	10659,90	10658,30
25	11775,50	11302,50	11013,80	10921,80	10659,90
26	11607,30	11775,50	11302,50	11013,80	10921,80
27	11669,30	11607,30	11775,50	11302,50	11013,80
28	11754,00	11669,30	11607,30	11775,50	11302,50
29	11392,60	11754,00	11669,30	11607,30	11775,50
30	11272,70	11392,60	11754,00	11669,30	11607,30
31	11291,90	11272,70	11392,60	11754,00	11669,30
32	11486,80	11291,90	11272,70	11392,60	11754,00
33	11574,40	11486,80	11291,90	11272,70	11392,60
34	10128,90	11574,40	11486,80	11291,90	11272,70

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
35	10616,10	10128,90	11574,40	11486,80	11291,90
36	10815,50	10616,10	10128,90	11574,40	11486,80
37	10841,80	10815,50	10616,10	10128,90	11574,40
38	10961,30	10841,80	10815,50	10616,10	10128,90
39	10817,50	10961,30	10841,80	10815,50	10616,10
40	10744,70	10817,50	10961,30	10841,80	10815,50
41	10614,10	10744,70	10817,50	10961,30	10841,80
42	10666,60	10614,10	10744,70	10817,50	10961,30
43	10604,30	10666,60	10614,10	10744,70	10817,50
44	9482,92	10604,30	10666,60	10614,10	10744,70
45	10581,50	9482,92	10604,30	10666,60	10614,10
46	9938,21	10581,50	9482,92	10604,30	10666,60
47	9644,31	9938,21	10581,50	9482,92	10604,30
48	9406,56	9644,31	9938,21	10581,50	9482,92
49	8892,65	9406,56	9644,31	9938,21	10581,50
50	9187,88	8892,65	9406,56	9644,31	9938,21
51	9408,46	9187,88	8892,65	9406,56	9644,31
52	9572,25	9408,46	9187,88	8892,65	9406,56
53	9631,43	9572,25	9408,46	9187,88	8892,65
54	9475,09	9631,43	9572,25	9408,46	9187,88
55	9773,83	9475,09	9631,43	9572,25	9408,46
56	9804,88	9773,83	9475,09	9631,43	9572,25
57	10153,20	9804,88	9773,83	9475,09	9631,43
58	10415,00	10153,20	9804,88	9773,83	9475,09
59	10743,00	10415,00	10153,20	9804,88	9773,83
60	10512,90	10743,00	10415,00	10153,20	9804,88
61	10886,20	10512,90	10743,00	10415,00	10153,20
62	10629,70	10886,20	10512,90	10743,00	10415,00
63	10565,90	10629,70	10886,20	10512,90	10743,00
64	11103,40	10565,90	10629,70	10886,20	10512,90
65	11169,00	11103,40	10565,90	10629,70	10886,20
66	11366,00	11169,00	11103,40	10565,90	10629,70
67	11219,20	11366,00	11169,00	11103,40	10565,90
68	11254,00	11219,20	11366,00	11169,00	11103,40
69	11504,70	11254,00	11219,20	11366,00	11169,00
70	11405,20	11504,70	11254,00	11219,20	11366,00
71	11119,60	11405,20	11504,70	11254,00	11219,20
72	11341,40	11119,60	11405,20	11504,70	11254,00
73	11311,10	11341,40	11119,60	11405,20	11504,70
74	11436,20	11311,10	11341,40	11119,60	11405,20
75	11510,00	11436,20	11311,10	11341,40	11119,60
76	11467,60	11510,00	11436,20	11311,10	11341,40
77	11300,70	11467,60	11510,00	11436,20	11311,10
78	11112,10	11300,70	11467,60	11510,00	11436,20
79	10962,90	11112,10	11300,70	11467,60	11510,00

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
80	10676,30	10962,90	11112,10	11300,70	11467,60
81	10783,90	10676,30	10962,90	11112,10	11300,70
82	10640,40	10783,90	10676,30	10962,90	11112,10
83	10712,90	10640,40	10783,90	10676,30	10962,90
84	10590,70	10712,90	10640,40	10783,90	10676,30
85	10393,30	10590,70	10712,90	10640,40	10783,90
86	10229,40	10393,30	10590,70	10712,90	10640,40
87	10306,30	10229,40	10393,30	10590,70	10712,90
88	10427,00	10306,30	10229,40	10393,30	10590,70
89	10540,90	10427,00	10306,30	10229,40	10393,30
90	10695,20	10540,90	10427,00	10306,30	10229,40
91	11056,30	10695,20	10540,90	10427,00	10306,30
92	11125,30	11056,30	10695,20	10540,90	10427,00
93	11088,90	11125,30	11056,30	10695,20	10540,90
94	11437,40	11088,90	11125,30	11056,30	10695,20
95	11407,10	11437,40	11088,90	11125,30	11056,30
96	11381,40	11407,10	11437,40	11088,90	11125,30
97	11579,30	11381,40	11407,10	11437,40	11088,90
98	11346,50	11579,30	11381,40	11407,10	11437,40
99	11084,70	11346,50	11579,30	11381,40	11407,10
100	11129,70	11084,70	11346,50	11579,30	11381,40
101	10973,40	11129,70	11084,70	11346,50	11579,30
102	10827,80	10973,40	11129,70	11084,70	11346,50
103	10644,70	10827,80	10973,40	11129,70	11084,70
104	10597,30	10644,70	10827,80	10973,40	11129,70
105	10489,20	10597,30	10644,70	10827,80	10973,40
106	10713,90	10489,20	10597,30	10644,70	10827,80
107	11036,70	10713,90	10489,20	10597,30	10644,70
108	11169,20	11036,70	10713,90	10489,20	10597,30
109	11107,50	11169,20	11036,70	10713,90	10489,20
110	10902,50	11107,50	11169,20	11036,70	10713,90
111	10783,90	10902,50	11107,50	11169,20	11036,70
112	10747,50	10783,90	10902,50	11107,50	11169,20
113	10756,80	10747,50	10783,90	10902,50	11107,50
114	10740,20	10756,80	10747,50	10783,90	10902,50
115	10927,80	10740,20	10756,80	10747,50	10783,90
116	10981,20	10927,80	10740,20	10756,80	10747,50
117	10884,40	10981,20	10927,80	10740,20	10756,80
118	10749,80	10884,40	10981,20	10927,80	10740,20
119	10690,90	10749,80	10884,40	10981,20	10927,80
120	10726,60	10690,90	10749,80	10884,40	10981,20
121	10502,90	10726,60	10690,90	10749,80	10884,40
122	10351,80	10502,90	10726,60	10690,90	10749,80
123	10546,90	10351,80	10502,90	10726,60	10690,90
124	10364,90	10546,90	10351,80	10502,90	10726,60

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
125	10399,70	10364,90	10546,90	10351,80	10502,90
126	10454,90	10399,70	10364,90	10546,90	10351,80
127	10658,80	10454,90	10399,70	10364,90	10546,90
128	10918,60	10658,80	10454,90	10399,70	10364,90
129	10791,40	10918,60	10658,80	10454,90	10399,70
130	10751,50	10791,40	10918,60	10658,80	10454,90
131	10856,90	10751,50	10791,40	10918,60	10658,80
132	10827,30	10856,90	10751,50	10791,40	10918,60
133	10544,50	10827,30	10856,90	10751,50	10791,40
134	10463,80	10544,50	10827,30	10856,90	10751,50
135	10475,20	10463,80	10544,50	10827,30	10856,90
136	10561,30	10475,20	10463,80	10544,50	10827,30
137	10598,30	10561,30	10475,20	10463,80	10544,50
138	10478,30	10598,30	10561,30	10475,20	10463,80
139	10445,00	10478,30	10598,30	10561,30	10475,20
140	10572,00	10445,00	10478,30	10598,30	10561,30
141	10621,20	10572,00	10445,00	10478,30	10598,30
142	11112,10	10621,20	10572,00	10445,00	10478,30
143	11499,90	11112,10	10621,20	10572,00	10445,00
144	11311,10	11499,90	11112,10	10621,20	10572,00
145	11547,40	11311,10	11499,90	11112,10	10621,20
146	11558,50	11547,40	11311,10	11499,90	11112,10
147	11762,30	11558,50	11547,40	11311,10	11499,90
148	11860,10	11762,30	11558,50	11547,40	11311,10
149	11916,10	11860,10	11762,30	11558,50	11547,40
150	11794,90	11916,10	11860,10	11762,30	11558,50
151	11877,50	11794,90	11916,10	11860,10	11762,30
152	11661,20	11877,50	11794,90	11916,10	11860,10
153	11688,90	11661,20	11877,50	11794,90	11916,10
154	11557,00	11688,90	11661,20	11877,50	11794,90
155	11845,90	11557,00	11688,90	11661,20	11877,50
156	12001,10	11845,90	11557,00	11688,90	11661,20
157	11798,00	12001,10	11845,90	11557,00	11688,90
158	11735,20	11798,00	12001,10	11845,90	11557,00
159	11623,40	11735,20	11798,00	12001,10	11845,90
160	11509,00	11623,40	11735,20	11798,00	12001,10
161	11611,80	11509,00	11623,40	11735,20	11798,00
162	11652,80	11611,80	11509,00	11623,40	11735,20
163	11637,10	11652,80	11611,80	11509,00	11623,40
164	11671,80	11637,10	11652,80	11611,80	11509,00
165	11636,50	11671,80	11637,10	11652,80	11611,80
166	11631,80	11636,50	11671,80	11637,10	11652,80
167	11581,30	11631,80	11636,50	11671,80	11637,10
168	11946,70	11581,30	11631,80	11636,50	11671,80
169	12317,70	11946,70	11581,30	11631,80	11636,50

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
170	12507,00	12317,70	11946,70	11581,30	11631,80
171	12715,20	12507,00	12317,70	11946,70	11581,30
172	12662,50	12715,20	12507,00	12317,70	11946,70
173	13005,00	12662,50	12715,20	12507,00	12317,70
174	12958,20	13005,00	12662,50	12715,20	12507,00
175	13419,30	12958,20	13005,00	12662,50	12715,20
176	13663,50	13419,30	12958,20	13005,00	12662,50
177	13845,00	13663,50	13419,30	12958,20	13005,00
178	14031,10	13845,00	13663,50	13419,30	12958,20
179	13798,30	14031,10	13845,00	13663,50	13419,30
180	13935,70	13798,30	14031,10	13845,00	13663,50
181	13758,80	13935,70	13798,30	14031,10	13845,00
182	13255,90	13758,80	13935,70	13798,30	14031,10
183	13055,90	13255,90	13758,80	13935,70	13798,30
184	13444,00	13055,90	13255,90	13758,80	13935,70
185	13880,50	13444,00	13055,90	13255,90	13758,80
186	14210,20	13880,50	13444,00	13055,90	13255,90
187	15719,70	14210,20	13880,50	13444,00	13055,90
188	15482,70	15719,70	14210,20	13880,50	13444,00
189	15147,80	15482,70	15719,70	14210,20	13880,50
190	14907,00	15147,80	15482,70	15719,70	14210,20
191	15420,60	14907,00	15147,80	15482,70	15719,70
192	15064,80	15420,60	14907,00	15147,80	15482,70
193	15023,00	15064,80	15420,60	14907,00	15147,80
194	15382,20	15023,00	15064,80	15420,60	14907,00
195	15596,80	15382,20	15023,00	15064,80	15420,60
196	15381,90	15596,80	15382,20	15023,00	15064,80
197	15358,70	15381,90	15596,80	15382,20	15023,00
198	15595,30	15358,70	15381,90	15596,80	15382,20
199	15300,40	15595,30	15358,70	15381,90	15596,80
200	14829,50	15300,40	15595,30	15358,70	15381,90
201	14866,30	14829,50	15300,40	15595,30	15358,70
202	14564,80	14866,30	14829,50	15300,40	15595,30
203	14673,40	14564,80	14866,30	14829,50	15300,40
204	15379,70	14673,40	14564,80	14866,30	14829,50
205	15754,30	15379,70	14673,40	14564,80	14866,30
206	16341,20	15754,30	15379,70	14673,40	14564,80
207	16268,30	16341,20	15754,30	15379,70	14673,40
208	16408,30	16268,30	16341,20	15754,30	15379,70
209	15536,80	16408,30	16268,30	16341,20	15754,30
210	15708,10	15536,80	16408,30	16268,30	16341,20
211	15528,60	15708,10	15536,80	16408,30	16268,30
212	15224,10	15528,60	15708,10	15536,80	16408,30
213	15771,40	15224,10	15528,60	15708,10	15536,80
214	16056,60	15771,40	15224,10	15528,60	15708,10

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
215	16080,70	16056,60	15771,40	15224,10	15528,60
216	15687,10	16080,70	16056,60	15771,40	15224,10
217	15760,50	15687,10	16080,70	16056,60	15771,40
218	15780,20	15760,50	15687,10	16080,70	16056,60
219	14617,50	15780,20	15760,50	15687,10	16080,70
220	16007,60	14617,50	15780,20	15760,50	15687,10
221	16242,00	16007,60	14617,50	15780,20	15760,50
222	16389,60	16242,00	16007,60	14617,50	15780,20
223	16271,90	16389,60	16242,00	16007,60	14617,50
224	16504,80	16271,90	16389,60	16242,00	16007,60
225	16913,30	16504,80	16271,90	16389,60	16242,00
226	16861,00	16913,30	16504,80	16271,90	16389,60
227	16614,70	16861,00	16913,30	16504,80	16271,90
228	16551,60	16614,70	16861,00	16913,30	16504,80
229	16955,20	16551,60	16614,70	16861,00	16913,30
230	17410,00	16955,20	16551,60	16614,70	16861,00
231	17208,50	17410,00	16955,20	16551,60	16614,70
232	17230,80	17208,50	17410,00	16955,20	16551,60
233	17742,40	17230,80	17208,50	17410,00	16955,20
234	18206,10	17742,40	17230,80	17208,50	17410,00
235	18387,60	18206,10	17742,40	17230,80	17208,50
236	18242,00	18387,60	18206,10	17742,40	17230,80
237	18239,90	18242,00	18387,60	18206,10	17742,40
238	17643,70	18239,90	18242,00	18387,60	18206,10
239	17996,80	17643,70	18239,90	18242,00	18387,60
240	17973,90	17996,80	17643,70	18239,90	18242,00
241	18292,90	17973,90	17996,80	17643,70	18239,90
242	18625,00	18292,90	17973,90	17996,80	17643,70
243	19147,70	18625,00	18292,90	17973,90	17996,80
244	19696,60	19147,70	18625,00	18292,90	17973,90
245	19013,80	19696,60	19147,70	18625,00	18292,90
246	19382,80	19013,80	19696,60	19147,70	18625,00
247	19404,90	19382,80	19013,80	19696,60	19147,70
248	19926,50	19404,90	19382,80	19013,80	19696,60
249	19558,80	19926,50	19404,90	19382,80	19013,80
250	19460,30	19558,80	19926,50	19404,90	19382,80
251	18818,60	19460,30	19558,80	19926,50	19404,90
252	18952,20	18818,60	19460,30	19558,80	19926,50
253	18301,20	18952,20	18818,60	19460,30	19558,80
254	17788,60	18301,20	18952,20	18818,60	19460,30
255	18832,80	17788,60	18301,20	18952,20	18818,60
256	18899,90	18832,80	17788,60	18301,20	18952,20
257	18518,10	18899,90	18832,80	17788,60	18301,20
258	18356,50	18518,10	18899,90	18832,80	17788,60
259	17899,50	18356,50	18518,10	18899,90	18832,80

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
260	17902,00	17899,50	18356,50	18518,10	18899,90
261	17282,30	17902,00	17899,50	18356,50	18518,10
262	17259,30	17282,30	17902,00	17899,50	18356,50
263	17033,80	17259,30	17282,30	17902,00	17899,50
264	16965,80	17033,80	17259,30	17282,30	17902,00
265	17641,00	16965,80	17033,80	17259,30	17282,30
266	17418,50	17641,00	16965,80	17033,80	17259,30
267	18000,30	17418,50	17641,00	16965,80	17033,80
268	18885,90	18000,30	17418,50	17641,00	16965,80
269	19000,50	18885,90	18000,30	17418,50	17641,00
270	19324,50	19000,50	18885,90	18000,30	17418,50
271	19010,10	19324,50	19000,50	18885,90	18000,30
272	19478,70	19010,10	19324,50	19000,50	18885,90
273	18606,00	19478,70	19010,10	19324,50	19000,50
274	18603,80	18606,00	19478,70	19010,10	19324,50
275	18284,00	18603,80	18606,00	19478,70	19010,10
276	18497,70	18284,00	18603,80	18606,00	19478,70
277	18707,10	18497,70	18284,00	18603,80	18606,00
278	18771,60	18707,10	18497,70	18284,00	18603,80
279	18889,20	18771,60	18707,10	18497,70	18284,00
280	18786,40	18889,20	18771,60	18707,10	18497,70
281	19356,60	18786,40	18889,20	18771,60	18707,10
282	19171,90	19356,60	18786,40	18889,20	18771,60
283	19015,50	19171,90	19356,60	18786,40	18889,20
284	19165,70	19015,50	19171,90	19356,60	18786,40
285	19495,40	19165,70	19015,50	19171,90	19356,60
286	19488,50	19495,40	19165,70	19015,50	19171,90
287	19798,80	19488,50	19495,40	19165,70	19015,50
288	19381,40	19798,80	19488,50	19495,40	19165,70
289	19364,40	19381,40	19798,80	19488,50	19495,40
290	19526,50	19364,40	19381,40	19798,80	19488,50
291	19321,60	19526,50	19364,40	19381,40	19798,80
292	19294,50	19321,60	19526,50	19364,40	19381,40
293	19611,10	19294,50	19321,60	19526,50	19364,40
294	20023,80	19611,10	19294,50	19321,60	19526,50
295	20167,20	20023,80	19611,10	19294,50	19321,60
296	20185,80	20167,20	20023,80	19611,10	19294,50
297	20347,80	20185,80	20167,20	20023,80	19611,10
298	20472,60	20347,80	20185,80	20167,20	20023,80
299	20836,10	20472,60	20347,80	20185,80	20167,20
300	20887,00	20836,10	20472,60	20347,80	20185,80
301	20030,70	20887,00	20836,10	20472,60	20347,80
302	20190,80	20030,70	20887,00	20836,10	20472,60
303	20322,20	20190,80	20030,70	20887,00	20836,10
304	20485,00	20322,20	20190,80	20030,70	20887,00

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
305	20330,90	20485,00	20322,20	20190,80	20030,70
306	20272,90	20330,90	20485,00	20322,20	20190,80
307	20040,10	20272,90	20330,90	20485,00	20322,20
308	19419,80	20040,10	20272,90	20330,90	20485,00
309	19505,20	19419,80	20040,10	20272,90	20330,90
310	19259,50	19505,20	19419,80	20040,10	20272,90
311	19104,40	19259,50	19505,20	19419,80	20040,10
312	18678,20	19104,40	19259,50	19505,20	19419,80
313	18687,50	18678,20	19104,40	19259,50	19505,20
314	19269,50	18687,50	18678,20	19104,40	19259,50
315	19935,70	19269,50	18687,50	18678,20	19104,40
316	19528,10	19935,70	19269,50	18687,50	18678,20
317	19270,40	19528,10	19935,70	19269,50	18687,50
318	19431,50	19270,40	19528,10	19935,70	19269,50
319	18586,50	19431,50	19270,40	19528,10	19935,70
320	18217,10	18586,50	19431,50	19270,40	19528,10
321	18229,70	18217,10	18586,50	19431,50	19270,40
322	17737,90	18229,70	18217,10	18586,50	19431,50
323	18022,70	17737,90	18229,70	18217,10	18586,50
324	17678,30	18022,70	17737,90	18229,70	18217,10
325	18244,70	17678,30	18022,70	17737,90	18229,70
326	18272,40	18244,70	17678,30	18022,70	17737,90
327	17624,10	18272,40	18244,70	17678,30	18022,70
328	17002,00	17624,10	18272,40	18244,70	17678,30
329	16807,70	17002,00	17624,10	18272,40	18244,70
330	17102,50	16807,70	17002,00	17624,10	18272,40
331	17144,70	17102,50	16807,70	17002,00	17624,10
332	16645,90	17144,70	17102,50	16807,70	17002,00
333	16531,30	16645,90	17144,70	17102,50	16807,70
334	15922,40	16531,30	16645,90	17144,70	17102,50
335	16124,30	15922,40	16531,30	16645,90	17144,70
336	16334,20	16124,30	15922,40	16531,30	16645,90
337	16628,80	16334,20	16124,30	15922,40	16531,30
338	17167,40	16628,80	16334,20	16124,30	15922,40
339	16791,10	17167,40	16628,80	16334,20	16124,30
340	17235,50	16791,10	17167,40	16628,80	16334,20
341	17164,00	17235,50	16791,10	17167,40	16628,80
342	17327,90	17164,00	17235,50	16791,10	17167,40
343	17081,10	17327,90	17164,00	17235,50	16791,10
344	16766,80	17081,10	17327,90	17164,00	17235,50
345	16867,50	16766,80	17081,10	17327,90	17164,00
346	17044,40	16867,50	16766,80	17081,10	17327,90
347	17708,20	17044,40	16867,50	16766,80	17081,10
348	18020,30	17708,20	17044,40	16867,50	16766,80
349	17604,10	18020,30	17708,20	17044,40	16867,50

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
350	17615,60	17604,10	18020,30	17708,20	17044,40
351	17786,40	17615,60	17604,10	18020,30	17708,20
352	17664,50	17786,40	17615,60	17604,10	18020,30
353	17079,80	17664,50	17786,40	17615,60	17604,10
354	17230,50	17079,80	17664,50	17786,40	17615,60
355	17099,00	17230,50	17079,80	17664,50	17786,40
356	16901,40	17099,00	17230,50	17079,80	17664,50
357	16964,10	16901,40	17099,00	17230,50	17079,80
358	16785,40	16964,10	16901,40	17099,00	17230,50
359	16752,80	16785,40	16964,10	16901,40	17099,00
360	16820,00	16752,80	16785,40	16964,10	16901,40
361	16888,60	16820,00	16752,80	16785,40	16964,10
362	17355,20	16888,60	16820,00	16752,80	16785,40
363	17710,40	17355,20	16888,60	16820,00	16752,80
364	17735,50	17710,40	17355,20	16888,60	16820,00
365	17967,60	17735,50	17710,40	17355,20	16888,60
366	18290,30	17967,60	17735,50	17710,40	17355,20
367	18416,40	18290,30	17967,60	17735,50	17710,40
368	18554,80	18416,40	18290,30	17967,60	17735,50
369	18237,60	18554,80	18416,40	18290,30	17967,60
370	18296,70	18237,60	18554,80	18416,40	18290,30
371	18076,90	18296,70	18237,60	18554,80	18416,40
372	18327,10	18076,90	18296,70	18237,60	18554,80
373	18368,40	18327,10	18076,90	18296,70	18237,60
374	18493,00	18368,40	18327,10	18076,90	18296,70
375	18635,20	18493,00	18368,40	18327,10	18076,90
376	18966,20	18635,20	18493,00	18368,40	18327,10
377	19157,30	18966,20	18635,20	18493,00	18368,40
378	18945,00	19157,30	18966,20	18635,20	18493,00
379	18881,30	18945,00	19157,30	18966,20	18635,20
380	18779,80	18881,30	18945,00	19157,30	18966,20
381	18628,70	18779,80	18881,30	18945,00	19157,30
382	18904,30	18628,70	18779,80	18881,30	18945,00
383	18645,40	18904,30	18628,70	18779,80	18881,30
384	18774,60	18645,40	18904,30	18628,70	18779,80
385	19018,60	18774,60	18645,40	18904,30	18628,70
386	19111,40	19018,60	18774,60	18645,40	18904,30
387	19380,90	19111,40	19018,60	18774,60	18645,40
388	19698,10	19380,90	19111,40	19018,60	18774,60
389	19427,40	19698,10	19380,90	19111,40	19018,60
390	19048,50	19427,40	19698,10	19380,90	19111,40
391	19344,30	19048,50	19427,40	19698,10	19380,90
392	19187,60	19344,30	19048,50	19427,40	19698,10
393	19248,10	19187,60	19344,30	19048,50	19427,40
394	19392,60	19248,10	19187,60	19344,30	19048,50

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
395	18908,60	19392,60	19248,10	19187,60	19344,30
396	18775,50	18908,60	19392,60	19248,10	19187,60
397	18826,00	18775,50	18908,60	19392,60	19248,10
398	18832,20	18826,00	18775,50	18908,60	19392,60
399	19459,70	18832,20	18826,00	18775,50	18908,60
400	19268,10	19459,70	18832,20	18826,00	18775,50
401	19187,80	19268,10	19459,70	18832,20	18826,00
402	19286,30	19187,80	19268,10	19459,70	18832,20
403	19363,70	19286,30	19187,80	19268,10	19459,70
404	19663,60	19363,70	19286,30	19187,80	19268,10
405	19558,00	19663,60	19363,70	19286,30	19187,80
406	19572,30	19558,00	19663,60	19363,70	19286,30
407	19855,30	19572,30	19558,00	19663,60	19363,70
408	20218,40	19855,30	19572,30	19558,00	19663,60
409	20512,20	20218,40	19855,30	19572,30	19558,00
410	20525,90	20512,20	20218,40	19855,30	19572,30
411	20775,00	20525,90	20512,20	20218,40	19855,30
412	20851,60	20775,00	20525,90	20512,20	20218,40
413	21119,20	20851,60	20775,00	20525,90	20512,20
414	21468,30	21119,20	20851,60	20775,00	20525,90
415	21398,00	21468,30	21119,20	20851,60	20775,00
416	21004,10	21398,00	21468,30	21119,20	20851,60
417	21060,20	21004,10	21398,00	21468,30	21119,20
418	21705,30	21060,20	21004,10	21398,00	21468,30
419	21616,50	21705,30	21060,20	21004,10	21398,00
420	21704,80	21616,50	21705,30	21060,20	21004,10
421	20833,20	21704,80	21616,50	21705,30	21060,20
422	20373,40	20833,20	21704,80	21616,50	21705,30
423	21192,90	20373,40	20833,20	21704,80	21616,50
424	21491,40	21192,90	20373,40	20833,20	21704,80
425	22276,70	21491,40	21192,90	20373,40	20833,20
426	22307,40	22276,70	21491,40	21192,90	20373,40
427	22083,00	22307,40	22276,70	21491,40	21192,90
428	22293,80	22083,00	22307,40	22276,70	21491,40
429	22219,90	22293,80	22083,00	22307,40	22276,70
430	21953,50	22219,90	22293,80	22083,00	22307,40
431	21722,50	21953,50	22219,90	22293,80	22083,00
432	21987,70	21722,50	21953,50	22219,90	22293,80
433	21612,50	21987,70	21722,50	21953,50	22219,90
434	22287,10	21612,50	21987,70	21722,50	21953,50
435	22432,20	22287,10	21612,50	21987,70	21722,50
436	22951,40	22432,20	22287,10	21612,50	21987,70
437	22787,30	22951,40	22432,20	22287,10	21612,50
438	22289,90	22787,30	22951,40	22432,20	22287,10
439	22630,00	22289,90	22787,30	22951,40	22432,20

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
440	22318,90	22630,00	22289,90	22787,30	22951,40
441	22477,10	22318,90	22630,00	22289,90	22787,30
442	22334,30	22477,10	22318,90	22630,00	22289,90
443	22550,90	22334,30	22477,10	22318,90	22630,00
444	22220,80	22550,90	22334,30	22477,10	22318,90
445	22201,50	22220,80	22550,90	22334,30	22477,10
446	22244,00	22201,50	22220,80	22550,90	22334,30
447	21907,80	22244,00	22201,50	22220,80	22550,90
448	22142,50	21907,80	22244,00	22201,50	22220,80
449	22565,80	22142,50	21907,80	22244,00	22201,50
450	22899,90	22565,80	22142,50	21907,80	22244,00
451	22857,90	22899,90	22565,80	22142,50	21907,80
452	23215,60	22857,90	22899,90	22565,80	22142,50
453	23437,80	23215,60	22857,90	22899,90	22565,80
454	23006,50	23437,80	23215,60	22857,90	22899,90
455	23215,60	23006,50	23437,80	23215,60	22857,90
456	22616,00	23215,60	23006,50	23437,80	23215,60
457	22544,30	22616,00	23215,60	23006,50	23437,80
458	22618,00	22544,30	22616,00	23215,60	23006,50
459	22186,90	22618,00	22544,30	22616,00	23215,60
460	22104,70	22186,90	22618,00	22544,30	22616,00
461	22566,40	22104,70	22186,90	22618,00	22544,30
462	23132,60	22566,40	22104,70	22186,90	22618,00
463	23176,70	23132,60	22566,40	22104,70	22186,90
464	22931,40	23176,70	23132,60	22566,40	22104,70
465	23472,40	22931,40	23176,70	23132,60	22566,40
466	23516,30	23472,40	22931,40	23176,70	23132,60
467	23464,50	23516,30	23472,40	22931,40	23176,70
468	23293,20	23464,50	23516,30	23472,40	22931,40
469	22799,20	23293,20	23464,50	23516,30	23472,40
470	22486,20	22799,20	23293,20	23464,50	23516,30
471	22560,90	22486,20	22799,20	23293,20	23464,50
472	23150,10	22560,90	22486,20	22799,20	23293,20
473	23008,10	23150,10	22560,90	22486,20	22799,20
474	23049,50	23008,10	23150,10	22560,90	22486,20
475	23075,60	23049,50	23008,10	23150,10	22560,90
476	22625,40	23075,60	23049,50	23008,10	23150,10
477	22679,90	22625,40	23075,60	23049,50	23008,10
478	22943,70	22679,90	22625,40	23075,60	23049,50
479	23634,80	22943,70	22679,90	22625,40	23075,60
480	23417,90	23634,80	22943,70	22679,90	22625,40
481	23289,70	23417,90	23634,80	22943,70	22679,90
482	23935,20	23289,70	23417,90	23634,80	22943,70
483	24360,60	23935,20	23289,70	23417,90	23634,80
484	24341,40	24360,60	23935,20	23289,70	23417,90

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
485	24044,60	24341,40	24360,60	23935,20	23289,70
486	24525,30	24044,60	24341,40	24360,60	23935,20
487	24430,80	24525,30	24044,60	24341,40	24360,60
488	24537,70	24430,80	24525,30	24044,60	24341,40
489	24590,80	24537,70	24430,80	24525,30	24044,60
490	24935,80	24590,80	24537,70	24430,80	24525,30
491	24971,70	24935,80	24590,80	24537,70	24430,80
492	25445,20	24971,70	24935,80	24590,80	24537,70
493	25042,00	25445,20	24971,70	24935,80	24590,80
494	24422,90	25042,00	25445,20	24971,70	24935,80
495	24561,90	24422,90	25042,00	25445,20	24971,70
496	25308,30	24561,90	24422,90	25042,00	25445,20
497	25604,70	25308,30	24561,90	24422,90	25042,00
498	26110,20	25604,70	25308,30	24561,90	24422,90
499	26271,30	26110,20	25604,70	25308,30	24561,90
500	26493,00	26271,30	26110,20	25604,70	25308,30
501	26362,70	26493,00	26271,30	26110,20	25604,70
502	26863,20	26362,70	26493,00	26271,30	26110,20
503	26813,10	26863,20	26362,70	26493,00	26271,30
504	26918,10	26813,10	26863,20	26362,70	26493,00
505	26469,40	26918,10	26813,10	26863,20	26362,70
506	26860,00	26469,40	26918,10	26813,10	26863,20
507	27056,00	26860,00	26469,40	26918,10	26813,10
508	27302,70	27056,00	26860,00	26469,40	26918,10
509	27074,10	27302,70	27056,00	26860,00	26469,40
510	27330,40	27074,10	27302,70	27056,00	26860,00
511	27849,80	27330,40	27074,10	27302,70	27056,00
512	27936,50	27849,80	27330,40	27074,10	27302,70
513	27554,80	27936,50	27849,80	27330,40	27074,10
514	27813,20	27554,80	27936,50	27849,80	27330,40
515	28201,70	27813,20	27554,80	27936,50	27849,80
516	28269,70	28201,70	27813,20	27554,80	27936,50
517	27528,10	28269,70	28201,70	27813,20	27554,80
518	27308,80	27528,10	28269,70	28201,70	27813,20
519	27736,30	27308,80	27528,10	28269,70	28201,70
520	28003,60	27736,30	27308,80	27528,10	28269,70
521	28164,10	28003,60	27736,30	27308,80	27528,10
522	27661,60	28164,10	28003,60	27736,30	27308,80
523	27000,40	27661,60	28164,10	28003,60	27736,30
524	27293,20	27000,40	27661,60	28164,10	28003,60
525	26864,30	27293,20	27000,40	27661,60	28164,10
526	26657,40	26864,30	27293,20	27000,40	27661,60
527	26921,30	26657,40	26864,30	27293,20	27000,40
528	27354,60	26921,30	26657,40	26864,30	27293,20
529	28031,50	27354,60	26921,30	26657,40	26864,30

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
530	28396,20	28031,50	27354,60	26921,30	26657,40
531	27768,50	28396,20	28031,50	27354,60	26921,30
532	27226,40	27768,50	28396,20	28031,50	27354,60
533	27558,90	27226,40	27768,50	28396,20	28031,50
534	27663,20	27558,90	27226,40	27768,50	28396,20
535	27789,90	27663,20	27558,90	27226,40	27768,50
536	27698,30	27789,90	27663,20	27558,90	27226,40
537	27746,40	27698,30	27789,90	27663,20	27558,90
538	27519,80	27746,40	27698,30	27789,90	27663,20
539	27572,80	27519,80	27746,40	27698,30	27789,90
540	26936,80	27572,80	27519,80	27746,40	27698,30
541	26547,20	26936,80	27572,80	27519,80	27746,40
542	25331,70	26547,20	26936,80	27572,80	27519,80
543	24476,00	25331,70	26547,20	26936,80	27572,80
544	25348,50	24476,00	25331,70	26547,20	26936,80
545	24636,70	25348,50	24476,00	25331,70	26547,20
546	25218,20	24636,70	25348,50	24476,00	25331,70
547	24439,30	25218,20	24636,70	25348,50	24476,00
548	25068,50	24439,30	25218,20	24636,70	25348,50
549	25502,60	25068,50	24439,30	25218,20	24636,70
550	24842,20	25502,60	25068,50	24439,30	25218,20
551	24479,70	24842,20	25502,60	25068,50	24439,30
552	24600,90	24479,70	24842,20	25502,60	25068,50
553	25557,80	24600,90	24479,70	24842,20	25502,60
554	25740,80	25557,80	24600,90	24479,70	24842,20
555	25445,10	25740,80	25557,80	24600,90	24479,70
556	25682,50	25445,10	25740,80	25557,80	24600,90
557	26056,60	25682,50	25445,10	25740,80	25557,80
558	25831,20	26056,60	25682,50	25445,10	25740,80
559	25786,50	25831,20	26056,60	25682,50	25445,10
560	25370,30	25786,50	25831,20	26056,60	25682,50
561	25078,00	25370,30	25786,50	25831,20	26056,60
562	25293,20	25078,00	25370,30	25786,50	25831,20
563	24542,00	25293,20	25078,00	25370,30	25786,50
564	23853,30	24542,00	25293,20	25078,00	25370,30
565	23285,90	23853,30	24542,00	25293,20	25078,00
566	24143,90	23285,90	23853,30	24542,00	25293,20
567	24175,90	24143,90	23285,90	23853,30	24542,00
568	24419,40	24175,90	24143,90	23285,90	23853,30
569	24730,80	24419,40	24175,90	24143,90	23285,90
570	24798,10	24730,80	24419,40	24175,90	24143,90
571	24484,00	24798,10	24730,80	24419,40	24175,90
572	24070,10	24484,00	24798,10	24730,80	24419,40
573	23519,60	24070,10	24484,00	24798,10	24730,80
574	23591,60	23519,60	24070,10	24484,00	24798,10

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
575	24253,00	23591,60	23519,60	24070,10	24484,00
576	24137,90	24253,00	23591,60	23519,60	24070,10
577	24560,20	24137,90	24253,00	23591,60	23519,60
578	25099,90	24560,20	24137,90	24253,00	23591,60
579	24950,80	25099,90	24560,20	24137,90	24253,00
580	24702,20	24950,80	25099,90	24560,20	24137,90
581	24688,30	24702,20	24950,80	25099,90	24560,20
582	24662,90	24688,30	24702,20	24950,80	25099,90
583	25114,40	24662,90	24688,30	24702,20	24950,80
584	25325,70	25114,40	24662,90	24688,30	24702,20
585	24921,30	25325,70	25114,40	24662,90	24688,30
586	24846,10	24921,30	25325,70	25114,40	24662,90
587	25205,50	24846,10	24921,30	25325,70	25114,40
588	25464,90	25205,50	24846,10	24921,30	25325,70
589	24329,10	25464,90	25205,50	24846,10	24921,30
590	24140,90	24329,10	25464,90	25205,50	24846,10
591	24119,80	24140,90	24329,10	25464,90	25205,50
592	24054,10	24119,80	24140,90	24329,10	25464,90
593	24453,10	24054,10	24119,80	24140,90	24329,10
594	24977,80	24453,10	24054,10	24119,80	24140,90
595	25236,50	24977,80	24453,10	24054,10	24119,80
596	25230,80	25236,50	24977,80	24453,10	24054,10
597	25799,10	25230,80	25236,50	24977,80	24453,10
598	26051,60	25799,10	25230,80	25236,50	24977,80
599	25533,10	26051,60	25799,10	25230,80	25236,50
600	25478,00	25533,10	26051,60	25799,10	25230,80
601	25779,80	25478,00	25533,10	26051,60	25799,10
602	25500,00	25779,80	25478,00	25533,10	26051,60
603	25725,20	25500,00	25779,80	25478,00	25533,10
604	25610,00	25725,20	25500,00	25779,80	25478,00
605	25929,90	25610,00	25725,20	25500,00	25779,80
606	26209,40	25929,90	25610,00	25725,20	25500,00
607	26579,70	26209,40	25929,90	25610,00	25725,20
608	26529,30	26579,70	26209,40	25929,90	25610,00
609	26709,20	26529,30	26579,70	26209,40	25929,90
610	26746,40	26709,20	26529,30	26579,70	26209,40
611	26779,30	26746,40	26709,20	26529,30	26579,70
612	27021,50	26779,30	26746,40	26709,20	26529,30
613	27033,40	27021,50	26779,30	26746,40	26709,20
614	26597,80	27033,40	27021,50	26779,30	26746,40
615	26811,40	26597,80	27033,40	27021,50	26779,30
616	27135,90	26811,40	26597,80	27033,40	27021,50
617	26957,30	27135,90	26811,40	26597,80	27033,40
618	27616,90	26957,30	27135,90	26811,40	26597,80
619	27702,30	27616,90	26957,30	27135,90	26811,40

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
620	27377,60	27702,30	27616,90	26957,30	27135,90
621	27781,40	27377,60	27702,30	27616,90	26957,30
622	27689,50	27781,40	27377,60	27702,30	27616,90
623	27842,40	27689,50	27781,40	27377,60	27702,30
624	27808,10	27842,40	27689,50	27781,40	27377,60
625	27689,20	27808,10	27842,40	27689,50	27781,40
626	28061,90	27689,20	27808,10	27842,40	27689,50
627	28500,90	28061,90	27689,20	27808,10	27842,40
628	28427,30	28500,90	28061,90	27689,20	27808,10
629	28402,70	28427,30	28500,90	28061,90	27689,20
630	28675,40	28402,70	28427,30	28500,90	28061,90
631	28713,50	28675,40	28402,70	28427,30	28500,90
632	28992,10	28713,50	28675,40	28402,70	28427,30
633	29188,10	28992,10	28713,50	28675,40	28402,70
634	29273,30	29188,10	28992,10	28713,50	28675,40
635	28730,70	29273,30	29188,10	28992,10	28713,50
636	29164,80	28730,70	29273,30	29188,10	28992,10
637	29343,00	29164,80	28730,70	29273,30	29188,10
638	29615,30	29343,00	29164,80	28730,70	29273,30
639	29776,70	29615,30	29343,00	29164,80	28730,70
640	29543,50	29776,70	29615,30	29343,00	29164,80
641	29727,10	29543,50	29776,70	29615,30	29343,00
642	30123,60	29727,10	29543,50	29776,70	29615,30
643	29945,40	30123,60	29727,10	29543,50	29776,70
644	29924,80	29945,40	30123,60	29727,10	29543,50
645	29701,00	29924,80	29945,40	30123,60	29727,10
646	29683,20	29701,00	29924,80	29945,40	30123,60
647	29111,80	29683,20	29701,00	29924,80	29945,40
648	28175,90	29111,80	29683,20	29701,00	29924,80
649	28074,90	28175,90	29111,80	29683,20	29701,00
650	28257,70	28074,90	28175,90	29111,80	29683,20
651	27906,30	28257,70	28074,90	28175,90	29111,80
652	28000,00	27906,30	28257,70	28074,90	28175,90
653	28456,90	28000,00	27906,30	28257,70	28074,90
654	28951,40	28456,90	28000,00	27906,30	28257,70
655	29191,60	28951,40	28456,90	28000,00	27906,30
656	29372,20	29191,60	28951,40	28456,90	28000,00
657	29814,20	29372,20	29191,60	28951,40	28456,90
658	30020,40	29814,20	29372,20	29191,60	28951,40
659	30015,10	30020,40	29814,20	29372,20	29191,60
660	30908,00	30015,10	30020,40	29814,20	29372,20
661	31948,00	30908,00	30015,10	30020,40	29814,20
662	31701,60	31948,00	30908,00	30015,10	30020,40
663	31879,50	31701,60	31948,00	30908,00	30015,10
664	31832,50	31879,50	31701,60	31948,00	30908,00

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
665	31385,00	31832,50	31879,50	31701,60	31948,00
666	31485,40	31385,00	31832,50	31879,50	31701,60
667	32202,70	31485,40	31385,00	31832,50	31879,50
668	32711,10	32202,70	31485,40	31385,00	31832,50
669	32541,10	32711,10	32202,70	31485,40	31385,00
670	32632,40	32541,10	32711,10	32202,70	31485,40
671	33271,10	32632,40	32541,10	32711,10	32202,70
672	33294,30	33271,10	32632,40	32541,10	32711,10
673	33221,20	33294,30	33271,10	32632,40	32541,10
674	33719,30	33221,20	33294,30	33271,10	32632,40
675	33863,80	33719,30	33221,20	33294,30	33271,10
676	33465,60	33863,80	33719,30	33221,20	33294,30
677	33250,50	33465,60	33863,80	33719,30	33221,20
678	33516,00	33250,50	33465,60	33863,80	33719,30
679	33319,20	33516,00	33250,50	33465,60	33863,80
680	32745,00	33319,20	33516,00	33250,50	33465,60
681	33396,20	32745,00	33319,20	33516,00	33250,50
682	33333,20	33396,20	32745,00	33319,20	33516,00
683	34300,90	33333,20	33396,20	32745,00	33319,20
684	35624,80	34300,90	33333,20	33396,20	32745,00
685	34775,70	35624,80	34300,90	33333,20	33396,20
686	33510,40	34775,70	35624,80	34300,90	33333,20
687	33413,60	33510,40	34775,70	35624,80	34300,90
688	33506,00	33413,60	33510,40	34775,70	35624,80
689	34040,20	33506,00	33413,60	33510,40	34775,70
690	33118,40	34040,20	33506,00	33413,60	33510,40
691	32054,30	33118,40	34040,20	33506,00	33413,60
692	31440,00	32054,30	33118,40	34040,20	33506,00
693	31850,70	31440,00	32054,30	33118,40	34040,20
694	31586,80	31850,70	31440,00	32054,30	33118,40
695	30766,70	31586,80	31850,70	31440,00	32054,30
696	31403,90	30766,70	31586,80	31850,70	31440,00
697	31428,60	31403,90	30766,70	31586,80	31850,70
698	31845,70	31428,60	31403,90	30766,70	31586,80
699	31670,00	31845,70	31428,60	31403,90	30766,70
700	31474,40	31670,00	31845,70	31428,60	31403,90
701	31273,30	31474,40	31670,00	31845,70	31428,60
702	31038,50	31273,30	31474,40	31670,00	31845,70
703	31964,00	31038,50	31273,30	31474,40	31670,00
704	32792,00	31964,00	31038,50	31273,30	31474,40
705	33152,10	32792,00	31964,00	31038,50	31273,30
706	33830,10	33152,10	32792,00	31964,00	31038,50
707	33749,40	33830,10	33152,10	32792,00	31964,00
708	33848,30	33749,40	33830,10	33152,10	32792,00
709	34709,70	33848,30	33749,40	33830,10	33152,10

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
710	34096,30	34709,70	33848,30	33749,40	33830,10
711	34171,50	34096,30	34709,70	33848,30	33749,40
712	34324,00	34171,50	34096,30	34709,70	33848,30
713	34866,60	34324,00	34171,50	34096,30	34709,70
714	35127,30	34866,60	34324,00	34171,50	34096,30
715	35314,30	35127,30	34866,60	34324,00	34171,50
716	35655,00	35314,30	35127,30	34866,60	34324,00
717	35254,10	35655,00	35314,30	35127,30	34866,60
718	36179,30	35254,10	35655,00	35314,30	35127,30
719	36907,80	36179,30	35254,10	35655,00	35314,30
720	36759,90	36907,80	36179,30	35254,10	35655,00
721	36621,50	36759,90	36907,80	36179,30	35254,10
722	37495,20	36621,50	36759,90	36907,80	36179,30
723	38088,70	37495,20	36621,50	36759,90	36907,80
724	38296,90	38088,70	37495,20	36621,50	36759,90
725	38573,70	38296,90	38088,70	37495,20	36621,50
726	39130,70	38573,70	38296,90	38088,70	37495,20
727	38917,80	39130,70	38573,70	38296,90	38088,70
728	38441,60	38917,80	39130,70	38573,70	38296,90
729	38587,80	38441,60	38917,80	39130,70	38573,70
730	37496,20	38587,80	38441,60	38917,80	39130,70
731	38202,20	37496,20	38587,80	38441,60	38917,80
732	37741,70	38202,20	37496,20	38587,80	38441,60
733	37870,60	37741,70	38202,20	37496,20	38587,80
734	37631,60	37870,60	37741,70	38202,20	37496,20
735	37716,70	37631,60	37870,60	37741,70	38202,20
736	37960,10	37716,70	37631,60	37870,60	37741,70
737	37729,40	37960,10	37716,70	37631,60	37870,60
738	38210,20	37729,40	37960,10	37716,70	37631,60
739	38353,10	38210,20	37729,40	37960,10	37716,70
740	38919,50	38353,10	38210,20	37729,40	37960,10
741	39139,10	38919,50	38353,10	38210,20	37729,40
742	39015,90	39139,10	38919,50	38353,10	38210,20
743	39220,20	39015,90	39139,10	38919,50	38353,10
744	39837,30	39220,20	39015,90	39139,10	38919,50
745	39777,70	39837,30	39220,20	39015,90	39139,10
746	39790,70	39777,70	39837,30	39220,20	39015,90
747	40665,40	39790,70	39777,70	39837,30	39220,20
748	41362,50	40665,40	39790,70	39777,70	39837,30
749	41722,40	41362,50	40665,40	39790,70	39777,70
750	41905,40	41722,40	41362,50	40665,40	39790,70
751	43628,80	41905,40	41722,40	41362,50	40665,40
752	44076,90	43628,80	41905,40	41722,40	41362,50
753	42622,90	44076,90	43628,80	41905,40	41722,40
754	43645,20	42622,90	44076,90	43628,80	41905,40

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
755	44465,70	43645,20	42622,90	44076,90	43628,80
756	43851,40	44465,70	43645,20	42622,90	44076,90
757	44434,50	43851,40	44465,70	43645,20	42622,90
758	45746,20	44434,50	43851,40	44465,70	43645,20
759	45784,10	45746,20	44434,50	43851,40	44465,70
760	45315,20	45784,10	45746,20	44434,50	43851,40
761	44891,30	45315,20	45784,10	45746,20	44434,50
762	44590,20	44891,30	45315,20	45784,10	45746,20
763	45250,70	44590,20	44891,30	45315,20	45784,10
764	44841,00	45250,70	44590,20	44891,30	45315,20
765	44228,00	44841,00	45250,70	44590,20	44891,30
766	44855,60	44228,00	44841,00	45250,70	44590,20
767	44653,00	44855,60	44228,00	44841,00	45250,70
768	43842,70	44653,00	44855,60	44228,00	44841,00
769	44117,50	43842,70	44653,00	44855,60	44228,00
770	44772,90	44117,50	43842,70	44653,00	44855,60
771	44046,30	44772,90	44117,50	43842,70	44653,00
772	43507,50	44046,30	44772,90	44117,50	43842,70
773	43804,00	43507,50	44046,30	44772,90	44117,50
774	45361,30	43804,00	43507,50	44046,30	44772,90
775	46244,30	45361,30	43804,00	43507,50	44046,30
776	46689,00	46244,30	45361,30	43804,00	43507,50
777	46710,90	46689,00	46244,30	45361,30	43804,00
778	46265,40	46710,90	46689,00	46244,30	45361,30
779	46553,60	46265,40	46710,90	46689,00	46244,30
780	46838,10	46553,60	46265,40	46710,90	46689,00
781	47728,50	46838,10	46553,60	46265,40	46710,90
782	47015,90	47728,50	46838,10	46553,60	46265,40
783	47493,00	47015,90	47728,50	46838,10	46553,60
784	46890,80	47493,00	47015,90	47728,50	46838,10
785	46366,20	46890,80	47493,00	47015,90	47728,50
786	45997,10	46366,20	46890,80	47493,00	47015,90
787	43889,80	45997,10	46366,20	46890,80	47493,00
788	42340,40	43889,80	45997,10	46366,20	46890,80
789	42863,40	42340,40	43889,80	45997,10	46366,20
790	42521,90	42863,40	42340,40	43889,80	45997,10
791	44346,00	42521,90	42863,40	42340,40	43889,80
792	42906,70	44346,00	42521,90	42863,40	42340,40
793	43236,70	42906,70	44346,00	42521,90	42863,40
794	44051,30	43236,70	42906,70	44346,00	42521,90
795	44688,10	44051,30	43236,70	42906,70	44346,00
796	44426,30	44688,10	44051,30	43236,70	42906,70
797	44399,40	44426,30	44688,10	44051,30	43236,70
798	44328,80	44399,40	44426,30	44688,10	44051,30
799	44531,20	44328,80	44399,40	44426,30	44688,10

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
800	43273,90	44531,20	44328,80	44399,40	44426,30
801	42710,50	43273,90	44531,20	44328,80	44399,40
802	41742,10	42710,50	43273,90	44531,20	44328,80
803	42507,00	41742,10	42710,50	43273,90	44531,20
804	42941,70	42507,00	41742,10	42710,50	43273,90
805	42911,30	42941,70	42507,00	41742,10	42710,50
806	44028,40	42911,30	42941,70	42507,00	41742,10
807	44070,90	44028,40	42911,30	42941,70	42507,00
808	44088,60	44070,90	44028,40	42911,30	42941,70
809	43710,60	44088,60	44070,90	44028,40	42911,30
810	44284,20	43710,60	44088,60	44070,90	44028,40
811	43099,30	44284,20	43710,60	44088,60	44070,90
812	42890,30	43099,30	44284,20	43710,60	44088,60
813	42505,00	42890,30	43099,30	44284,20	43710,60
814	41919,30	42505,00	42890,30	43099,30	44284,20
815	42212,00	41919,30	42505,00	42890,30	43099,30
816	41860,70	42212,00	41919,30	42505,00	42890,30
817	42864,90	41860,70	42212,00	41919,30	42505,00
818	43732,50	42864,90	41860,70	42212,00	41919,30
819	43872,80	43732,50	42864,90	41860,70	42212,00
820	45075,90	43872,80	43732,50	42864,90	41860,70
821	45278,40	45075,90	43872,80	43732,50	42864,90
822	45352,50	45278,40	45075,90	43872,80	43732,50
823	44745,50	45352,50	45278,40	45075,90	43872,80
824	43752,00	44745,50	45352,50	45278,40	45075,90
825	43880,40	43752,00	44745,50	45352,50	45278,40
826	44030,40	43880,40	43752,00	44745,50	45352,50
827	44413,60	44030,40	43880,40	43752,00	44745,50
828	44647,80	44413,60	44030,40	43880,40	43752,00
829	44251,40	44647,80	44413,60	44030,40	43880,40
830	44212,80	44251,40	44647,80	44413,60	44030,40
831	44712,90	44212,80	44251,40	44647,80	44413,60
832	44563,30	44712,90	44212,80	44251,40	44647,80
833	43599,00	44563,30	44712,90	44212,80	44251,40
834	43713,20	43599,00	44563,30	44712,90	44212,80
835	41970,80	43713,20	43599,00	44563,30	44712,90
836	40268,70	41970,80	43713,20	43599,00	44563,30
837	41044,10	40268,70	41970,80	43713,20	43599,00
838	40439,20	41044,10	40268,70	41970,80	43713,20
839	39643,70	40439,20	41044,10	40268,70	41970,80
840	36351,10	39643,70	40439,20	41044,10	40268,70
841	37235,50	36351,10	39643,70	40439,20	41044,10
842	36100,70	37235,50	36351,10	39643,70	40439,20
843	36730,20	36100,70	37235,50	36351,10	39643,70
844	38593,50	36730,20	36100,70	37235,50	36351,10

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
845	38908,60	38593,50	36730,20	36100,70	37235,50
846	37860,80	38908,60	38593,50	36730,20	36100,70
847	38132,20	37860,80	38908,60	38593,50	36730,20
848	38395,20	38132,20	37860,80	38908,60	38593,50
849	39285,80	38395,20	38132,20	37860,80	38908,60
850	37964,00	39285,80	38395,20	38132,20	37860,80
851	37464,40	37964,00	39285,80	38395,20	38132,20
852	36709,60	37464,40	37964,00	39285,80	38395,20
853	35338,70	36709,60	37464,40	37964,00	39285,80
854	34802,60	35338,70	36709,60	37464,40	37964,00
855	34330,30	34802,60	35338,70	36709,60	37464,40
856	32384,40	34330,30	34802,60	35338,70	36709,60
857	32899,70	32384,40	34330,30	34802,60	35338,70
858	33627,40	32899,70	32384,40	34330,30	34802,60
859	34048,00	33627,40	32899,70	32384,40	34330,30
860	34807,70	34048,00	33627,40	32899,70	32384,40
861	34601,40	34807,70	34048,00	33627,40	32899,70
862	33762,00	34601,40	34807,70	34048,00	33627,40
863	34229,00	33762,00	34601,40	34807,70	34048,00
864	33132,30	34229,00	33762,00	34601,40	34807,70
865	31950,60	33132,30	34229,00	33762,00	34601,40
866	32470,40	31950,60	33132,30	34229,00	33762,00
867	33207,10	32470,40	31950,60	33132,30	34229,00
868	34031,10	33207,10	32470,40	31950,60	33132,30
869	35453,30	34031,10	33207,10	32470,40	31950,60
870	35456,50	35453,30	34031,10	33207,10	32470,40
871	36481,20	35456,50	35453,30	34031,10	33207,10
872	35385,00	36481,20	35456,50	35453,30	34031,10
873	35698,70	35385,00	36481,20	35456,50	35453,30
874	36202,20	35698,70	35385,00	36481,20	35456,50
875	36148,40	36202,20	35698,70	35385,00	36481,20
876	35955,80	36148,40	36202,20	35698,70	35385,00
877	35815,50	35955,80	36148,40	36202,20	35698,70
878	35010,50	35815,50	35955,80	36148,40	36202,20
879	33831,70	35010,50	35815,50	35955,80	36148,40
880	32702,90	33831,70	35010,50	35815,50	35955,80
881	33618,00	32702,90	33831,70	35010,50	35815,50
882	33554,40	33618,00	32702,90	33831,70	35010,50
883	35311,00	33554,40	33618,00	32702,90	33831,70
884	34988,80	35311,00	33554,40	33618,00	32702,90
885	34959,00	34988,80	35311,00	33554,40	33618,00
886	35264,40	34959,00	34988,80	35311,00	33554,40
887	35984,50	35264,40	34959,00	34988,80	35311,00
888	36747,30	35984,50	35264,40	34959,00	34988,80
889	36101,90	36747,30	35984,50	35264,40	34959,00

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
890	36067,90	36101,90	36747,30	35984,50	35264,40
891	35742,80	36067,90	36101,90	36747,30	35984,50
892	35721,60	35742,80	36067,90	36101,90	36747,30
893	35262,90	35721,60	35742,80	36067,90	36101,90
894	36159,60	35262,90	35721,60	35742,80	36067,90
895	35967,50	36159,60	35262,90	35721,60	35742,80
896	36535,70	35967,50	36159,60	35262,90	35721,60
897	37563,30	36535,70	35967,50	36159,60	35262,90
898	37389,30	37563,30	36535,70	35967,50	36159,60
899	37418,10	37389,30	37563,30	36535,70	35967,50
900	37631,10	37418,10	37389,30	37563,30	36535,70
901	37806,50	37631,10	37418,10	37389,30	37563,30
902	38433,40	37806,50	37631,10	37418,10	37389,30
903	37885,30	38433,40	37806,50	37631,10	37418,10
904	37384,80	37885,30	38433,40	37806,50	37631,10
905	37164,90	37384,80	37885,30	38433,40	37806,50
906	37130,80	37164,90	37384,80	37885,30	38433,40
907	37121,80	37130,80	37164,90	37384,80	37885,30
908	36651,40	37121,80	37130,80	37164,90	37384,80
909	36861,70	36651,40	37121,80	37130,80	37164,90
910	36686,70	36861,70	36651,40	37121,80	37130,80
911	36897,20	36686,70	36861,70	36651,40	37121,80
912	37285,90	36897,20	36686,70	36861,70	36651,40
913	37414,90	37285,90	36897,20	36686,70	36861,70
914	38139,10	37414,90	37285,90	36897,20	36686,70
915	38180,00	38139,10	37414,90	37285,90	36897,20
916	37689,70	38180,00	38139,10	37414,90	37285,90
917	37457,00	37689,70	38180,00	38139,10	37414,90
918	37372,00	37457,00	37689,70	38180,00	38139,10
919	37172,60	37372,00	37457,00	37689,70	38180,00
920	37624,50	37172,60	37372,00	37457,00	37689,70
921	37774,60	37624,50	37172,60	37372,00	37457,00
922	37478,70	37774,60	37624,50	37172,60	37372,00
923	38143,90	37478,70	37774,60	37624,50	37172,60
924	38245,90	38143,90	37478,70	37774,60	37624,50
925	38345,10	38245,90	38143,90	37478,70	37774,60
926	38275,00	38345,10	38245,90	38143,90	37478,70
927	37790,80	38275,00	38345,10	38245,90	38143,90
928	36390,00	37790,80	38275,00	38345,10	38245,90
929	36084,20	36390,00	37790,80	38275,00	38345,10
930	36432,40	36084,20	36390,00	37790,80	38275,00
931	36818,70	36432,40	36084,20	36390,00	37790,80
932	37268,20	36818,70	36432,40	36084,20	36390,00
933	36924,90	37268,20	36818,70	36432,40	36084,20
934	36983,90	36924,90	37268,20	36818,70	36432,40

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
935	36830,40	36983,90	36924,90	37268,20	36818,70
936	36389,70	36830,40	36983,90	36924,90	37268,20
937	36917,40	36389,70	36830,40	36983,90	36924,90
938	36737,60	36917,40	36389,70	36830,40	36983,90
939	36885,90	36737,60	36917,40	36389,70	36830,40
940	37449,20	36885,90	36737,60	36917,40	36389,70
941	37660,40	37449,20	36885,90	36737,60	36917,40
942	38316,90	37660,40	37449,20	36885,90	36737,60
943	38486,10	38316,90	37660,40	37449,20	36885,90
944	38998,00	38486,10	38316,90	37660,40	37449,20
945	38456,80	38998,00	38486,10	38316,90	37660,40
946	39743,80	38456,80	38998,00	38486,10	38316,90
947	39823,90	39743,80	38456,80	38998,00	38486,10
948	39643,80	39823,90	39743,80	38456,80	38998,00
949	40591,10	39643,80	39823,90	39743,80	38456,80
950	40683,30	40591,10	39643,80	39823,90	39743,80
951	40081,40	40683,30	40591,10	39643,80	39823,90
952	40582,30	40081,40	40683,30	40591,10	39643,80
953	40601,70	40582,30	40081,40	40683,30	40591,10
954	39504,10	40601,70	40582,30	40081,40	40683,30
955	39307,10	39504,10	40601,70	40582,30	40081,40
956	39675,90	39307,10	39504,10	40601,70	40582,30
957	40163,70	39675,90	39307,10	39504,10	40601,70
958	39736,70	40163,70	39675,90	39307,10	39504,10
959	39890,90	39736,70	40163,70	39675,90	39307,10
960	39627,20	39890,90	39736,70	40163,70	39675,90
961	39030,30	39627,20	39890,90	39736,70	40163,70
962	39655,10	39030,30	39627,20	39890,90	39736,70
963	39654,10	39655,10	39030,30	39627,20	39890,90
964	39268,10	39654,10	39655,10	39030,30	39627,20
965	38432,80	39268,10	39654,10	39655,10	39030,30
966	38346,60	38432,80	39268,10	39654,10	39655,10
967	38501,10	38346,60	38432,80	39268,10	39654,10
968	37733,60	38501,10	38346,60	38432,80	39268,10
969	38077,10	37733,60	38501,10	38346,60	38432,80
970	37582,10	38077,10	37733,60	38501,10	38346,60
971	38238,60	37582,10	38077,10	37733,60	38501,10
972	37183,80	38238,60	37582,10	38077,10	37733,60
973	38066,90	37183,80	38238,60	37582,10	38077,10
974	38168,50	38066,90	37183,80	38238,60	37582,10
975	38196,50	38168,50	38066,90	37183,80	38238,60
976	37654,70	38196,50	38168,50	38066,90	37183,80
977	38163,00	37654,70	38196,50	38168,50	38066,90
978	38184,80	38163,00	37654,70	38196,50	38168,50
979	39857,80	38184,80	38163,00	37654,70	38196,50

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
980	39320,50	39857,80	38184,80	38163,00	37654,70
981	39461,90	39320,50	39857,80	38184,80	38163,00
982	39213,00	39461,90	39320,50	39857,80	38184,80
983	38874,90	39213,00	39461,90	39320,50	39857,80
984	39595,40	38874,90	39213,00	39461,90	39320,50
985	40204,80	39595,40	38874,90	39213,00	39461,90
986	39832,50	40204,80	39595,40	38874,90	39213,00
987	39071,10	39832,50	40204,80	39595,40	38874,90
988	38996,70	39071,10	39832,50	40204,80	39595,40
989	39083,00	38996,70	39071,10	39832,50	40204,80
990	39180,20	39083,00	38996,70	39071,10	39832,50
991	38705,40	39180,20	39083,00	38996,70	39071,10
992	38766,60	38705,40	39180,20	39083,00	38996,70
993	38610,60	38766,60	38705,40	39180,20	39083,00
994	39138,20	38610,60	38766,60	38705,40	39180,20
995	39117,50	39138,20	38610,60	38766,60	38705,40
996	39006,30	39117,50	39138,20	38610,60	38766,60
997	38435,20	39006,30	39117,50	39138,20	38610,60
998	37832,10	38435,20	39006,30	39117,50	39138,20
999	37083,10	37832,10	38435,20	39006,30	39117,50
1000	36629,90	37083,10	37832,10	38435,20	39006,30
1001	37640,40	36629,90	37083,10	37832,10	38435,20
1002	38138,20	37640,40	36629,90	37083,10	37832,10
1003	39043,00	38138,20	37640,40	36629,90	37083,10
1004	38888,50	39043,00	38138,20	37640,40	36629,90
1005	39218,10	38888,50	39043,00	38138,20	37640,40
1006	40256,30	39218,10	38888,50	39043,00	38138,20
1007	40201,10	40256,30	39218,10	38888,50	39043,00
1008	41247,00	40201,10	40256,30	39218,10	38888,50
1009	41250,10	41247,00	40201,10	40256,30	39218,10
1010	42035,50	41250,10	41247,00	40201,10	40256,30
1011	42122,70	42035,50	41250,10	41247,00	40201,10
1012	41846,40	42122,70	42035,50	41250,10	41247,00
1013	41397,40	41846,40	42122,70	42035,50	41250,10
1014	41357,50	41397,40	41846,40	42122,70	42035,50
1015	41182,60	41357,50	41397,40	41846,40	42122,70
1016	42302,00	41182,60	41357,50	41397,40	41846,40
1017	43112,50	42302,00	41182,60	41357,50	41397,40
1018	42700,50	43112,50	42302,00	41182,60	41357,50
1019	42501,40	42700,50	43112,50	42302,00	41182,60
1020	42099,00	42501,40	42700,50	43112,50	42302,00
1021	41645,20	42099,00	42501,40	42700,50	43112,50
1022	42185,50	41645,20	42099,00	42501,40	42700,50
1023	42025,90	42185,50	41645,20	42099,00	42501,40
1024	42551,60	42025,90	42185,50	41645,20	42099,00

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
1025	43256,30	42551,60	42025,90	42185,50	41645,20
1026	43813,70	43256,30	42551,60	42025,90	42185,50
1027	43636,20	43813,70	43256,30	42551,60	42025,90
1028	44252,90	43636,20	43813,70	43256,30	42551,60
1029	44061,50	44252,90	43636,20	43813,70	43256,30
1030	42888,60	44061,50	44252,90	43636,20	43813,70
1031	43829,10	42888,60	44061,50	44252,90	43636,20
1032	43591,70	43829,10	42888,60	44061,50	44252,90
1033	43736,80	43591,70	43829,10	42888,60	44061,50
1034	41774,00	43736,80	43591,70	43829,10	42888,60
1035	41431,00	41774,00	43736,80	43591,70	43829,10
1036	39588,20	41431,00	41774,00	43736,80	43591,70
1037	40550,30	39588,20	41431,00	41774,00	43736,80
1038	39729,40	40550,30	39588,20	41431,00	41774,00
1039	40230,80	39729,40	40550,30	39588,20	41431,00
1040	40406,50	40230,80	39729,40	40550,30	39588,20
1041	41406,90	40406,50	40230,80	39729,40	40550,30
1042	42056,30	41406,90	40406,50	40230,80	39729,40
1043	41978,30	42056,30	41406,90	40406,50	40230,80
1044	41666,00	41978,30	42056,30	41406,90	40406,50
1045	40501,90	41666,00	41978,30	42056,30	41406,90
1046	41195,20	40501,90	41666,00	41978,30	42056,30
1047	41819,80	41195,20	40501,90	41666,00	41978,30
1048	41922,20	41819,80	41195,20	40501,90	41666,00
1049	41817,70	41922,20	41819,80	41195,20	40501,90
1050	42419,40	41817,70	41922,20	41819,80	41195,20
1051	43239,80	42419,40	41817,70	41922,20	41819,80
1052	43408,70	43239,80	42419,40	41817,70	41922,20
1053	43263,60	43408,70	43239,80	42419,40	41817,70
1054	43097,10	43263,60	43408,70	43239,80	42419,40
1055	43079,50	43097,10	43263,60	43408,70	43239,80
1056	43666,20	43079,50	43097,10	43263,60	43408,70
1057	43661,10	43666,20	43079,50	43097,10	43263,60
1058	43542,20	43661,10	43666,20	43079,50	43097,10
1059	44309,30	43542,20	43661,10	43666,20	43079,50
1060	44660,70	44309,30	43542,20	43661,10	43666,20
1061	45714,10	44660,70	44309,30	43542,20	43661,10
1062	45845,20	45714,10	44660,70	44309,30	43542,20
1063	45889,20	45845,20	45714,10	44660,70	44309,30
1064	45339,80	45889,20	45845,20	45714,10	44660,70
1065	46105,80	45339,80	45889,20	45845,20	45714,10
1066	45566,10	46105,80	45339,80	45889,20	45845,20
1067	46044,20	45566,10	46105,80	45339,80	45889,20
1068	46697,10	46044,20	45566,10	46105,80	45339,80
1069	46621,50	46697,10	46044,20	45566,10	46105,80

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
1070	45634,00	46621,50	46697,10	46044,20	45566,10
1071	46308,10	45634,00	46621,50	46697,10	46044,20
1072	47355,80	46308,10	45634,00	46621,50	46697,10
1073	47014,90	47355,80	46308,10	45634,00	46621,50
1074	48032,70	47014,90	47355,80	46308,10	45634,00
1075	47826,10	48032,70	47014,90	47355,80	46308,10
1076	46861,30	47826,10	48032,70	47014,90	47355,80
1077	44984,50	46861,30	47826,10	48032,70	47014,90
1078	43529,50	44984,50	46861,30	47826,10	48032,70
1079	44256,10	43529,50	44984,50	46861,30	47826,10
1080	45077,70	44256,10	43529,50	44984,50	46861,30
1081	44818,10	45077,70	44256,10	43529,50	44984,50
1082	44681,10	44818,10	45077,70	44256,10	43529,50
1083	44707,30	44681,10	44818,10	45077,70	44256,10
1084	45102,70	44707,30	44681,10	44818,10	45077,70
1085	45055,60	45102,70	44707,30	44681,10	44818,10
1086	44820,80	45055,60	45102,70	44707,30	44681,10
1087	45142,20	44820,80	45055,60	45102,70	44707,30
1088	44897,70	45142,20	44820,80	45055,60	45102,70
1089	45539,70	44897,70	45142,20	44820,80	45055,60
1090	45860,00	45539,70	44897,70	45142,20	44820,80
1091	46073,30	45860,00	45539,70	44897,70	45142,20
1092	46209,10	46073,30	45860,00	45539,70	44897,70
1093	46369,20	46209,10	46073,30	45860,00	45539,70
1094	46424,70	46369,20	46209,10	46073,30	45860,00
1095	46237,10	46424,70	46369,20	46209,10	46073,30
1096	46194,30	46237,10	46424,70	46369,20	46209,10
1097	46927,80	46194,30	46237,10	46424,70	46369,20
1098	47003,00	46927,80	46194,30	46237,10	46424,70
1099	46274,70	47003,00	46927,80	46194,30	46237,10
1100	47081,50	46274,70	47003,00	46927,80	46194,30
1101	46490,10	47081,50	46274,70	47003,00	46927,80
1102	46111,10	46490,10	47081,50	46274,70	47003,00
1103	46451,60	46111,10	46490,10	47081,50	46274,70
1104	45861,00	46451,60	46111,10	46490,10	47081,50
1105	44843,90	45861,00	46451,60	46111,10	46490,10
1106	44332,40	44843,90	45861,00	46451,60	46111,10
1107	44893,70	44332,40	44843,90	45861,00	46451,60
1108	44372,00	44893,70	44332,40	44843,90	45861,00
1109	44629,50	44372,00	44893,70	44332,40	44843,90
1110	44675,50	44629,50	44372,00	44893,70	44332,40
1111	45971,80	44675,50	44629,50	44372,00	44893,70
1112	46367,60	45971,80	44675,50	44629,50	44372,00
1113	46231,80	46367,60	45971,80	44675,50	44629,50
1114	46251,20	46231,80	46367,60	45971,80	44675,50

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
1115	45952,40	46251,20	46231,80	46367,60	45971,80
1116	45705,10	45952,40	46251,20	46231,80	46367,60
1117	45417,10	45705,10	45952,40	46251,20	46231,80
1118	46010,10	45417,10	45705,10	45952,40	46251,20
1119	45161,80	46010,10	45417,10	45705,10	45952,40
1120	46181,40	45161,80	46010,10	45417,10	45705,10
1121	47093,70	46181,40	45161,80	46010,10	45417,10
1122	47730,50	47093,70	46181,40	45161,80	46010,10
1123	48680,30	47730,50	47093,70	46181,40	45161,80
1124	49476,30	48680,30	47730,50	47093,70	46181,40
1125	49850,10	49476,30	48680,30	47730,50	47093,70
1126	49895,30	49850,10	49476,30	48680,30	47730,50
1127	51281,90	49895,30	49850,10	49476,30	48680,30
1128	50557,60	51281,90	49895,30	49850,10	49476,30
1129	50055,50	50557,60	51281,90	49895,30	49850,10
1130	52005,80	50055,50	50557,60	51281,90	49895,30
1131	52086,70	52005,80	50055,50	50557,60	51281,90
1132	51774,40	52086,70	52005,80	50055,50	50557,60

Test

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
1	51643,80	51774,40	52086,70	52005,80	50055,50
2	51112,00	51643,80	51774,40	52086,70	52005,80
3	53325,30	51112,00	51643,80	51774,40	52086,70
4	52935,80	53325,30	51112,00	51643,80	51774,40
5	55625,40	52935,80	53325,30	51112,00	51643,80
6	54930,70	55625,40	52935,80	53325,30	51112,00
7	54831,90	54930,70	55625,40	52935,80	53325,30
8	52512,40	54831,90	54930,70	55625,40	52935,80
9	51561,90	52512,40	54831,90	54930,70	55625,40
10	51459,20	51561,90	52512,40	54831,90	54930,70
11	52824,90	51459,20	51561,90	52512,40	54831,90
12	51299,30	52824,90	51459,20	51561,90	52512,40
13	51393,60	51299,30	52824,90	51459,20	51561,90
14	50716,40	51393,60	51299,30	52824,90	51459,20
15	50429,90	50716,40	51393,60	51299,30	52824,90
16	50708,20	50429,90	50716,40	51393,60	51299,30
17	52070,60	50708,20	50429,90	50716,40	51393,60
18	49974,80	52070,60	50708,20	50429,90	50716,40
19	49186,40	49974,80	52070,60	50708,20	50429,90
20	50272,50	49186,40	49974,80	52070,60	50708,20
21	49880,90	50272,50	49186,40	49974,80	52070,60
22	47714,10	49880,90	50272,50	49186,40	49974,80
23	44473,30	47714,10	49880,90	50272,50	49186,40
24	46576,90	44473,30	47714,10	49880,90	50272,50
25	46148,80	46576,90	44473,30	47714,10	49880,90

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
26	45265,00	46148,80	46576,90	44473,30	47714,10
27	46882,00	45265,00	46148,80	46576,90	44473,30
28	47388,60	46882,00	45265,00	46148,80	46576,90
29	46824,00	47388,60	46882,00	45265,00	46148,80
30	47914,40	46824,00	47388,60	46882,00	45265,00
31	47750,70	47914,40	46824,00	47388,60	46882,00
32	48082,20	47750,70	47914,40	46824,00	47388,60
33	50198,60	48082,20	47750,70	47914,40	46824,00
34	49936,90	50198,60	48082,20	47750,70	47914,40
35	50032,60	49936,90	50198,60	48082,20	47750,70
36	49421,40	50032,60	49936,90	50198,60	48082,20
37	49601,40	49421,40	50032,60	49936,90	50198,60
38	49050,40	49601,40	49421,40	50032,60	49936,90
39	48548,90	49050,40	49601,40	49421,40	50032,60
40	49296,20	48548,90	49050,40	49601,40	49421,40
41	49233,10	49296,20	48548,90	49050,40	49601,40
42	49680,50	49233,10	49296,20	48548,90	49050,40
43	50620,90	49680,50	49233,10	49296,20	48548,90
44	50536,50	50620,90	49680,50	49233,10	49296,20
45	50500,90	50536,50	50620,90	49680,50	49233,10
46	53884,10	50500,90	50536,50	50620,90	49680,50
47	53543,10	53884,10	50500,90	50536,50	50620,90
48	53882,10	53543,10	53884,10	50500,90	50536,50
49	53580,70	53882,10	53543,10	53884,10	50500,90
50	52893,20	53580,70	53882,10	53543,10	53884,10
51	54245,80	52893,20	53580,70	53882,10	53543,10
52	54390,20	54245,80	52893,20	53580,70	53882,10
53	54044,20	54390,20	54245,80	52893,20	53580,70
54	54198,00	54044,20	54390,20	54245,80	52893,20
55	54733,30	54198,00	54044,20	54390,20	54245,80
56	54164,90	54733,30	54198,00	54044,20	54390,20
57	54915,90	54164,90	54733,30	54198,00	54044,20
58	56793,00	54915,90	54164,90	54733,30	54198,00
59	56279,10	56793,00	54915,90	54164,90	54733,30
60	57910,60	56279,10	56793,00	54915,90	54164,90
61	57418,00	57910,60	56279,10	56793,00	54915,90
62	58053,40	57418,00	57910,60	56279,10	56793,00
63	58231,90	58053,40	57418,00	57910,60	56279,10
64	57185,40	58231,90	58053,40	57418,00	57910,60
65	57931,90	57185,40	58231,90	58053,40	57418,00
66	56268,20	57931,90	57185,40	58231,90	58053,40
67	55486,80	56268,20	57931,90	57185,40	58231,90
68	53969,80	55486,80	56268,20	57931,90	57185,40
69	55752,20	53969,80	55486,80	56268,20	57931,90
70	55638,90	55752,20	53969,80	55486,80	56268,20

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
71	55728,60	55638,90	55752,20	53969,80	55486,80
72	56446,60	55728,60	55638,90	55752,20	53969,80
73	56774,30	56446,60	55728,60	55638,90	55752,20
74	57615,70	56774,30	56446,60	55728,60	55638,90
75	57371,30	57615,70	56774,30	56446,60	55728,60
76	56855,10	57371,30	57615,70	56774,30	56446,60
77	56064,30	56855,10	57371,30	57615,70	56774,30
78	56906,00	56064,30	56855,10	57371,30	57615,70
79	56076,40	56906,00	56064,30	56855,10	57371,30
80	55160,80	56076,40	56906,00	56064,30	56855,10
81	53689,10	55160,80	56076,40	56906,00	56064,30
82	54084,00	53689,10	55160,80	56076,40	56906,00
83	54719,00	54084,00	53689,10	55160,80	56076,40
84	55664,90	54719,00	54084,00	53689,10	55160,80
85	54743,00	55664,90	54719,00	54084,00	53689,10
86	54304,50	54743,00	55664,90	54719,00	54084,00
87	53262,90	54304,50	54743,00	55664,90	54719,00
88	53577,80	53262,90	54304,50	54743,00	55664,90
89	52615,60	53577,80	53262,90	54304,50	54743,00
90	52199,30	52615,60	53577,80	53262,90	54304,50
91	52331,30	52199,30	52615,60	53577,80	53262,90
92	52682,50	52331,30	52199,30	52615,60	53577,80
93	51452,30	52682,50	52331,30	52199,30	52615,60
94	53202,80	51452,30	52682,50	52331,30	52199,30
95	53181,20	53202,80	51452,30	52682,50	52331,30
96	54213,80	53181,20	53202,80	51452,30	52682,50
97	54320,00	54213,80	53181,20	53202,80	51452,30
98	54013,30	54320,00	54213,80	53181,20	53202,80
99	55521,20	54013,30	54320,00	54213,80	53181,20
100	56186,90	55521,20	54013,30	54320,00	54213,80
101	56490,60	56186,90	55521,20	54013,30	54320,00
102	56518,60	56490,60	56186,90	55521,20	54013,30
103	56271,30	56518,60	56490,60	56186,90	55521,20
104	56766,20	56271,30	56518,60	56490,60	56186,90
105	55239,00	56766,20	56271,30	56518,60	56490,60
106	54911,70	55239,00	56766,20	56271,30	56518,60
107	53603,40	54911,70	55239,00	56766,20	56271,30
108	54223,60	53603,40	54911,70	55239,00	56766,20
109	53847,40	54223,60	53603,40	54911,70	55239,00
110	55510,50	53847,40	54223,60	53603,40	54911,70
111	55380,70	55510,50	53847,40	54223,60	53603,40
112	55373,20	55380,70	55510,50	53847,40	54223,60
113	55233,00	55373,20	55380,70	55510,50	53847,40
114	55698,40	55233,00	55373,20	55380,70	55510,50
115	55538,10	55698,40	55233,00	55373,20	55380,70

Data No	d_t	x_{t-1}	x_{t-2}	x_{t-3}	x_{t-4}
116	54708,40	55538,10	55698,40	55233,00	55373,20
117	53541,30	54708,40	55538,10	55698,40	55233,00
118	52529,90	53541,30	54708,40	55538,10	55698,40
119	52569,50	52529,90	53541,30	54708,40	55538,10
120	53235,90	52569,50	52529,90	53541,30	54708,40
121	52730,70	53235,90	52569,50	52529,90	53541,30
122	52351,00	52730,70	53235,90	52569,50	52529,90
123	51920,60	52351,00	52730,70	53235,90	52569,50
124	51480,90	51920,60	52351,00	52730,70	53235,90
125	50377,30	51480,90	51920,60	52351,00	52730,70
126	49093,80	50377,30	51480,90	51920,60	52351,00
127	48902,80	49093,80	50377,30	51480,90	51920,60
128	48657,50	48902,80	49093,80	50377,30	51480,90
129	45544,10	48657,50	48902,80	49093,80	50377,30
130	44593,70	45544,10	48657,50	48902,80	49093,80
131	42539,50	44593,70	45544,10	48657,50	48902,80
132	45010,70	42539,50	44593,70	45544,10	48657,50
133	45497,20	45010,70	42539,50	44593,70	45544,10
134	43706,70	45497,20	45010,70	42539,50	44593,70
135	44572,70	43706,70	45497,20	45010,70	42539,50
136	44304,40	44572,70	43706,70	45497,20	45010,70
137	42697,60	44304,40	44572,70	43706,70	45497,20
138	44452,10	42697,60	44304,40	44572,70	43706,70
139	45719,90	44452,10	42697,60	44304,40	44572,70
140	44350,80	45719,90	44452,10	42697,60	44304,40
141	43317,50	44350,80	45719,90	44452,10	42697,60
142	41866,40	43317,50	44350,80	45719,90	44452,10
143	41957,90	41866,40	43317,50	44350,80	45719,90
144	41342,80	41957,90	41866,40	43317,50	44350,80
145	43539,90	41342,80	41957,90	41866,40	43317,50
146	44752,50	43539,90	41342,80	41957,90	41866,40
147	45493,70	44752,50	43539,90	41342,80	41957,90
148	44305,30	45493,70	44752,50	43539,90	41342,80
149	45741,70	44305,30	45493,70	44752,50	43539,90
150	46249,30	45741,70	44305,30	45493,70	44752,50
151	45876,70	46249,30	45741,70	44305,30	45493,70
152	46446,60	45876,70	46249,30	45741,70	44305,30
153	45592,50	46446,60	45876,70	46249,30	45741,70
154	44895,00	45592,50	46446,60	45876,70	46249,30
155	45524,50	44895,00	45592,50	46446,60	45876,70
156	46260,30	45524,50	44895,00	45592,50	46446,60
157	45823,30	46260,30	45524,50	44895,00	45592,50
158	44776,90	45823,30	46260,30	45524,50	44895,00
159	43343,60	44776,90	45823,30	46260,30	45524,50
160	42923,00	43343,60	44776,90	45823,30	46260,30

APPENDIX_B

MLP RESULTS FOR TRAINING AND TEST

Training			Result No		
Result No	d_t	y_t		d_t	y_t
1	10161,20	10691,88	36	10815,50	11219,92
2	10225,80	10626,54	37	10841,80	10967,02
3	10204,10	10541,03	38	10961,30	11132,17
4	10412,70	10650,86	39	10817,50	11243,76
5	10124,90	10751,58	40	10744,70	11212,98
6	10280,70	10663,99	41	10614,10	11194,96
7	10467,90	10739,48	42	10666,60	11090,99
8	10348,30	10759,51	43	10604,30	11069,51
9	10590,30	10782,36	44	9482,92	11015,13
10	10570,40	10914,53	45	10581,50	10576,58
11	10544,70	10912,31	46	9938,21	10818,70
12	10881,90	10966,22	47	9644,31	10423,55
13	10825,90	11094,40	48	9406,56	10502,19
14	10931,10	11117,94	49	8892,65	10197,75
15	10742,90	11247,53	50	9187,88	9874,92
16	10725,70	11173,97	51	9408,46	9840,39
17	10945,70	11166,75	52	9572,25	9826,72
18	11032,00	11200,32	53	9631,43	9999,53
19	11122,00	11264,39	54	9475,09	10110,20
20	10658,30	11377,70	55	9773,83	10105,08
21	10659,90	11229,31	56	9804,88	10215,53
22	10921,80	11183,41	57	10153,20	10231,20
23	11013,80	11158,02	58	10415,00	10455,14
24	11302,50	11234,00	59	10743,00	10624,69
25	11775,50	11442,10	60	10512,90	10896,27
26	11607,30	11712,97	61	10886,20	10930,03
27	11669,30	11803,17	62	10629,70	11139,23
28	11754,00	11939,50	63	10565,90	11031,58
29	11392,60	11937,79	64	11103,40	11069,44
30	11272,70	11818,60	65	11169,00	11206,63
31	11291,90	11736,15	66	11366,00	11300,24
32	11486,80	11621,08	67	11219,20	11545,57
33	11574,40	11666,99	68	11254,00	11537,20
34	10128,90	11739,84	69	11504,70	11584,95
35	10616,10	11222,84	70	11405,20	11652,75
			71	11119,60	11661,40

Result No	d_t	y_t
72	11341,40	11600,23
73	11311,10	11618,35
74	11436,20	11558,84
75	11510,00	11667,63
76	11467,60	11710,71
77	11300,70	11741,04
78	11112,10	11687,27
79	10962,90	11571,57
80	10676,30	11432,52
81	10783,90	11237,71
82	10640,40	11191,31
83	10712,90	11067,79
84	10590,70	11102,31
85	10393,30	11024,75
86	10229,40	10945,72
87	10306,30	10815,98
88	10427,00	10764,04
89	10540,90	10776,18
90	10695,20	10861,14
91	11056,30	10975,89
92	11125,30	11180,32
93	11088,90	11310,88
94	11437,40	11410,68
95	11407,10	11569,74
96	11381,40	11603,50
97	11579,30	11688,13
98	11346,50	11758,72
99	11084,70	11686,89
100	11129,70	11599,02
101	10973,40	11510,09
102	10827,80	11376,61
103	10644,70	11303,35
104	10597,30	11162,38
105	10489,20	11071,60
106	10713,90	10967,58
107	11036,70	11025,67
108	11169,20	11161,49
109	11107,50	11330,97
110	10902,50	11419,83
111	10783,90	11365,89
112	10747,50	11268,80
113	10756,80	11176,36
114	10740,20	11138,75
115	10927,80	11122,20

Result No	d_t	y_t
116	10981,20	11197,96
117	10884,40	11244,97
118	10749,80	11267,36
119	10690,90	11213,95
120	10726,60	11141,84
121	10502,90	11107,81
122	10351,80	11005,66
123	10546,90	10919,84
124	10364,90	10911,15
125	10399,70	10824,42
126	10454,90	10863,48
127	10658,80	10841,34
128	10918,60	10940,23
129	10791,40	11093,78
130	10751,50	11141,40
131	10856,90	11180,11
132	10827,30	11182,09
133	10544,50	11174,52
134	10463,80	11085,34
135	10475,20	11001,24
136	10561,30	10912,83
137	10598,30	10923,59
138	10478,30	10954,61
139	10445,00	10936,60
140	10572,00	10915,60
141	10621,20	10927,68
142	11112,10	10957,12
143	11499,90	11200,23
144	11311,10	11454,20
145	11547,40	11579,08
146	11558,50	11759,74
147	11762,30	11749,74
148	11860,10	11903,96
149	11916,10	11982,22
150	11794,90	12081,07
151	11877,50	12068,53
152	11661,20	12100,05
153	11688,90	11988,30
154	11557,00	11988,01
155	11845,90	11875,48
156	12001,10	11980,96
157	11798,00	12055,29
158	11735,20	12078,97
159	11623,40	12065,91

Result No	d _t	y _t
160	11509,00	11951,00
161	11611,80	11865,91
162	11652,80	11857,11
163	11637,10	11857,05
164	11671,80	11886,38
165	11636,50	11910,64
166	11631,80	11897,25
167	11581,30	11899,54
168	11946,70	11867,76
169	12317,70	12010,47
170	12507,00	12213,04
171	12715,20	12462,89
172	12662,50	12693,17
173	13005,00	12761,00
174	12958,20	12962,14
175	13419,30	12983,97
176	13663,50	13280,20
177	13845,00	13452,28
178	14031,10	13714,71
179	13798,30	13900,91
180	13935,70	13882,89
181	13758,80	13959,79
182	13255,90	13833,77
183	13055,90	13623,85
184	13444,00	13398,86
185	13880,50	13381,88
186	14210,20	13581,44
187	15719,70	13924,31
188	15482,70	14812,42
189	15147,80	15071,67
190	14907,00	15336,17
191	15420,60	15072,34
192	15064,80	15163,55
193	15023,00	15019,59
194	15382,20	15098,04
195	15596,80	15141,38
196	15381,90	15296,95
197	15358,70	15347,33
198	15595,30	15360,45
199	15300,40	15397,44
200	14829,50	15297,65
201	14866,30	15101,25
202	14564,80	14941,87
203	14673,40	14667,92

Result No	d _t	y _t
204	15379,70	14677,41
205	15754,30	14928,28
206	16341,20	15269,39
207	16268,30	15838,35
208	16408,30	16016,57
209	15536,80	16248,91
210	15708,10	15829,02
211	15528,60	15796,53
212	15224,10	15471,32
213	15771,40	15357,46
214	16056,60	15499,99
215	16080,70	15641,94
216	15687,10	15881,73
217	15760,50	15780,26
218	15780,20	15747,31
219	14617,50	15646,75
220	16007,60	15138,82
221	16242,00	15580,27
222	16389,60	15585,67
223	16271,90	16154,02
224	16504,80	16169,81
225	16913,30	16302,47
226	16861,00	16503,66
227	16614,70	16630,84
228	16551,60	16626,36
229	16955,20	16526,38
230	17410,00	16632,41
231	17208,50	16915,87
232	17230,80	17032,66
233	17742,40	17141,39
234	18206,10	17323,54
235	18387,60	17666,14
236	18242,00	18012,32
237	18239,90	18107,72
238	17643,70	18123,39
239	17996,80	17774,08
240	17973,90	17838,46
241	18292,90	17704,76
242	18625,00	17988,48
243	19147,70	18201,46
244	19696,60	18639,02
245	19013,80	19126,07
246	19382,80	19037,05
247	19404,90	19252,40

Result No	d_t	y_t
248	19926,50	19097,17
249	19558,80	19517,19
250	19460,30	19422,01
251	18818,60	19465,75
252	18952,20	18979,18
253	18301,20	18901,67
254	17788,60	18396,22
255	18832,80	18074,63
256	18899,90	18287,08
257	18518,10	18380,49
258	18356,50	18551,10
259	17899,50	18382,70
260	17902,00	17999,23
261	17282,30	17870,66
262	17259,30	17424,28
263	17033,80	17306,22
264	16965,80	16995,91
265	17641,00	16924,08
266	17418,50	17170,83
267	18000,30	17172,99
268	18885,90	17638,50
269	19000,50	18110,12
270	19324,50	18539,58
271	19010,10	18998,11
272	19478,70	18904,24
273	18606,00	19185,45
274	18603,80	18717,32
275	18284,00	18706,87
276	18497,70	18252,60
277	18707,10	18319,84
278	18771,60	18365,04
279	18889,20	18517,33
280	18786,40	18651,02
281	19356,60	18635,57
282	19171,90	18944,59
283	19015,50	18925,06
284	19165,70	18995,85
285	19495,40	18962,91
286	19488,50	19118,71
287	19798,80	19235,06
288	19381,40	19497,43
289	19364,40	19326,90
290	19526,50	19335,95
291	19321,60	19270,56

Result No	d_t	y_t
292	19294,50	19205,61
293	19611,10	19203,99
294	20023,80	19290,71
295	20167,20	19569,06
296	20185,80	19832,58
297	20347,80	19992,71
298	20472,60	20111,42
299	20836,10	20210,57
300	20887,00	20482,48
301	20030,70	20617,76
302	20190,80	20283,90
303	20322,20	20196,97
304	20485,00	20020,13
305	20330,90	20219,56
306	20272,90	20206,43
307	20040,10	20191,68
308	19419,80	20000,43
309	19505,20	19617,72
310	19259,50	19466,19
311	19104,40	19165,30
312	18678,20	19084,89
313	18687,50	18755,09
314	19269,50	18634,36
315	19935,70	18801,11
316	19528,10	19281,99
317	19270,40	19390,77
318	19431,50	19369,26
319	18586,50	19245,42
320	18217,10	18775,35
321	18229,70	18484,94
322	17737,90	18146,25
323	18022,70	17806,33
324	17678,30	17866,66
325	18244,70	17593,12
326	18272,40	17912,71
327	17624,10	17918,36
328	17002,00	17789,18
329	16807,70	17356,46
330	17102,50	16941,57
331	17144,70	16861,01
332	16645,90	16886,47
333	16531,30	16748,84
334	15922,40	16609,28
335	16124,30	16142,07

Result No	d_t	y_t
336	16334,20	16095,87
337	16628,80	16043,15
338	17167,40	16295,81
339	16791,10	16676,26
340	17235,50	16682,73
341	17164,00	16994,80
342	17327,90	16912,75
343	17081,10	17128,73
344	16766,80	17006,12
345	16867,50	16860,48
346	17044,40	16769,48
347	17708,20	16778,96
348	18020,30	17177,47
349	17604,10	17515,56
350	17615,60	17575,05
351	17786,40	17584,28
352	17664,50	17530,88
353	17079,80	17516,14
354	17230,50	17259,26
355	17099,00	17180,77
356	16901,40	16962,27
357	16964,10	16899,69
358	16785,40	16848,61
359	16752,80	16713,63
360	16820,00	16687,79
361	16888,60	16656,58
362	17355,20	16695,23
363	17710,40	16958,28
364	17735,50	17243,56
365	17967,60	17471,78
366	18290,30	17694,40
367	18416,40	17900,03
368	18554,80	18100,55
369	18237,60	18292,58
370	18296,70	18189,72
371	18076,90	18199,08
372	18327,10	17994,94
373	18368,40	18105,29
374	18493,00	18102,55
375	18635,20	18260,27
376	18966,20	18362,68
377	19157,30	18598,77
378	18945,00	18804,53
379	18881,30	18835,04

Result No	d_t	y_t
380	18779,80	18811,28
381	18628,70	18672,59
382	18904,30	18561,85
383	18645,40	18641,95
384	18774,60	18518,50
385	19018,60	18627,17
386	19111,40	18685,16
387	19380,90	18831,04
388	19698,10	19063,53
389	19427,40	19303,92
390	19048,50	19309,97
391	19344,30	19153,08
392	19187,60	19132,30
393	19248,10	18997,20
394	19392,60	19105,66
395	18908,60	19131,32
396	18775,50	18935,35
397	18826,00	18817,16
398	18832,20	18656,91
399	19459,70	18641,56
400	19268,10	18986,54
401	19187,80	19012,36
402	19286,30	19135,94
403	19363,70	19086,51
404	19663,60	19126,63
405	19558,00	19332,78
406	19572,30	19359,07
407	19855,30	19439,81
408	20218,40	19544,88
409	20512,20	19801,91
410	20525,90	20123,81
411	20775,00	20297,13
412	20851,60	20512,77
413	21119,20	20595,80
414	21468,30	20836,52
415	21398,00	21094,21
416	21004,10	21212,07
417	21060,20	21084,00
418	21705,30	20993,11
419	21616,50	21229,36
420	21704,80	21353,95
421	20833,20	21592,24
422	20373,40	21074,35
423	21192,90	20685,42

Result No	d_t	y_t
424	21491,40	20742,34
425	22276,70	20964,03
426	22307,40	21753,38
427	22083,00	21987,55
428	22293,80	22109,64
429	22219,90	22142,26
430	21953,50	22071,06
431	21722,50	21990,01
432	21987,70	21771,86
433	21612,50	21786,41
434	22287,10	21576,08
435	22432,20	21967,61
436	22951,40	22052,93
437	22787,30	22618,73
438	22289,90	22641,90
439	22630,00	22489,61
440	22318,90	22487,99
441	22477,10	22236,27
442	22334,30	22398,35
443	22550,90	22230,85
444	22220,80	22390,86
445	22201,50	22197,52
446	22244,00	22196,23
447	21907,80	22095,73
448	22142,50	21932,03
449	22565,80	22005,67
450	22899,90	22177,57
451	22857,90	22551,67
452	23215,60	22723,59
453	23437,80	22998,38
454	23006,50	23165,23
455	23215,60	23088,50
456	22616,00	23162,49
457	22544,30	22717,16
458	22618,00	22645,00
459	22186,90	22463,80
460	22104,70	22252,91
461	22566,40	22145,22
462	23132,60	22238,77
463	23176,70	22653,08
464	22931,40	22956,81
465	23472,40	22982,53
466	23516,30	23211,98
467	23464,50	23270,74

Result No	d_t	y_t
468	23293,20	23444,31
469	22799,20	23312,45
470	22486,20	22978,49
471	22560,90	22647,88
472	23150,10	22474,34
473	23008,10	22747,62
474	23049,50	22838,24
475	23075,60	23019,22
476	22625,40	22957,27
477	22679,90	22733,24
478	22943,70	22674,10
479	23634,80	22685,24
480	23417,90	23178,86
481	23289,70	23287,74
482	23935,20	23376,14
483	24360,60	23596,24
484	24341,40	23955,26
485	24044,60	24258,89
486	24525,30	24172,25
487	24430,80	24345,52
488	24537,70	24301,64
489	24590,80	24522,16
490	24935,80	24507,53
491	24971,70	24762,02
492	25445,20	24867,89
493	25042,00	25261,75
494	24422,90	25112,57
495	24561,90	24813,45
496	25308,30	24590,31
497	25604,70	24886,70
498	26110,20	25323,80
499	26271,30	25923,68
500	26493,00	26161,99
501	26362,70	26467,49
502	26863,20	26442,86
503	26813,10	26769,40
504	26918,10	26789,30
505	26469,40	27015,05
506	26860,00	26702,99
507	27056,00	26874,08
508	27302,70	26926,97
509	27074,10	27291,50
510	27330,40	27231,86
511	27849,80	27393,31

Result No	d_t	y_t
512	27936,50	27668,75
513	27554,80	27947,97
514	27813,20	27872,59
515	28201,70	27912,90
516	28269,70	28079,17
517	27528,10	28335,17
518	27308,80	27991,42
519	27736,30	27667,84
520	28003,60	27635,97
521	28164,10	27906,73
522	27661,60	28227,35
523	27000,40	27994,23
524	27293,20	27500,50
525	26864,30	27351,68
526	26657,40	27004,49
527	26921,30	26942,71
528	27354,60	26888,20
529	28031,50	27186,57
530	28396,20	27805,27
531	27768,50	28297,71
532	27226,40	28164,62
533	27558,90	27731,24
534	27663,20	27571,93
535	27789,90	27606,93
536	27698,30	27871,67
537	27746,40	27841,94
538	27519,80	27879,07
539	27572,80	27709,57
540	26936,80	27714,97
541	26547,20	27266,23
542	25331,70	26929,11
543	24476,00	25920,75
544	25348,50	25094,92
545	24636,70	25059,55
546	25218,20	24664,86
547	24439,30	25199,08
548	25068,50	24571,99
549	25502,60	25011,15
550	24842,20	25104,05
551	24479,70	25081,68
552	24600,90	24813,19
553	25557,80	24556,74
554	25740,80	25076,10
555	25445,10	25468,57

Result No	d_t	y_t
556	25682,50	25636,25
557	26056,60	25683,66
558	25831,20	25846,42
559	25786,50	25899,99
560	25370,30	25922,06
561	25078,00	25560,73
562	25293,20	25303,16
563	24542,00	25234,66
564	23853,30	24786,66
565	23285,90	24320,03
566	24143,90	23596,47
567	24175,90	23791,24
568	24419,40	23862,09
569	24730,80	24332,71
570	24798,10	24509,98
571	24484,00	24694,74
572	24070,10	24608,60
573	23519,60	24298,59
574	23591,60	23790,06
575	24253,00	23602,06
576	24137,90	23845,63
577	24560,20	23987,35
578	25099,90	24417,85
579	24950,80	24735,48
580	24702,20	24915,11
581	24688,30	24877,66
582	24662,90	24722,35
583	25114,40	24636,44
584	25325,70	24909,03
585	24921,30	25126,09
586	24846,10	25084,62
587	25205,50	24981,85
588	25464,90	25026,69
589	24329,10	25268,07
590	24140,90	24784,83
591	24119,80	24483,72
592	24054,10	24048,25
593	24453,10	24028,37
594	24977,80	24250,80
595	25236,50	24623,69
596	25230,80	25027,85
597	25799,10	25219,97
598	26051,60	25593,03
599	25533,10	25845,79

Result No	d _t	y _t
600	25478,00	25779,41
601	25779,80	25661,34
602	25500,00	25637,81
603	25725,20	25568,16
604	25610,00	25740,96
605	25929,90	25606,18
606	26209,40	25867,13
607	26579,70	26047,41
608	26529,30	26446,51
609	26709,20	26559,86
610	26746,40	26748,61
611	26779,30	26758,94
612	27021,50	26849,81
613	27033,40	26997,04
614	26597,80	27066,17
615	26811,40	26880,83
616	27135,90	26889,79
617	26957,30	26993,40
618	27616,90	27071,69
619	27702,30	27513,01
620	27377,60	27625,21
621	27781,40	27676,99
622	27689,50	27804,08
623	27842,40	27728,74
624	27808,10	27964,33
625	27689,20	27905,06
626	28061,90	27883,22
627	28500,90	28055,59
628	28427,30	28377,14
629	28402,70	28565,77
630	28675,40	28629,90
631	28713,50	28717,79
632	28992,10	28805,47
633	29188,10	29075,65
634	29273,30	29241,59
635	28730,70	29423,46
636	29164,80	29134,47
637	29343,00	29279,46
638	29615,30	29311,54
639	29776,70	29725,46
640	29543,50	29891,84
641	29727,10	29846,61
642	30123,60	29922,03
643	29945,40	30119,88

Result No	d _t	y _t
644	29924,80	30188,78
645	29701,00	30233,35
646	29683,20	29982,15
647	29111,80	29935,16
648	28175,90	29510,00
649	28074,90	28824,75
650	28257,70	28374,92
651	27906,30	28238,34
652	28000,00	28138,78
653	28456,90	28184,11
654	28951,40	28353,96
655	29191,60	28834,98
656	29372,20	29234,33
657	29814,20	29504,64
658	30020,40	29837,52
659	30015,10	30097,17
660	30908,00	30257,55
661	31948,00	30824,92
662	31701,60	31669,38
663	31879,50	32040,15
664	31832,50	32285,97
665	31385,00	32070,26
666	31485,40	31864,66
667	32202,70	31781,79
668	32711,10	32133,06
669	32541,10	32726,63
670	32632,40	32943,09
671	33271,10	33004,24
672	33294,30	33306,07
673	33221,20	33528,78
674	33719,30	33663,51
675	33863,80	33870,87
676	33465,60	34058,90
677	33250,50	33996,06
678	33516,00	33723,29
679	33319,20	33702,00
680	32745,00	33640,62
681	33396,20	33337,81
682	33333,20	33516,75
683	34300,90	33495,24
684	35624,80	34389,14
685	34775,70	35356,87
686	33510,40	35423,48
687	33413,60	34619,20

Result No	d _t	y _t
688	33506,00	33786,24
689	34040,20	33600,68
690	33118,40	34142,73
691	32054,30	33721,49
692	31440,00	32962,68
693	31850,70	31971,41
694	31586,80	31910,65
695	30766,70	31813,62
696	31403,90	31444,60
697	31428,60	31513,92
698	31845,70	31470,75
699	31670,00	32052,67
700	31474,40	31955,56
701	31273,30	31912,33
702	31038,50	31624,84
703	31964,00	31395,16
704	32792,00	31892,54
705	33152,10	32601,19
706	33830,10	33351,50
707	33749,40	33984,90
708	33848,30	34072,41
709	34709,70	34259,25
710	34096,30	34703,80
711	34171,50	34558,43
712	34324,00	34693,70
713	34866,60	34486,92
714	35127,30	34999,17
715	35314,30	35331,27
716	35655,00	35647,06
717	35254,10	35893,67
718	36179,30	35724,00
719	36907,80	36290,49
720	36759,90	36813,05
721	36621,50	37229,75
722	37495,20	37137,25
723	38088,70	37492,64
724	38296,90	38079,77
725	38573,70	38627,32
726	39130,70	38849,97
727	38917,80	39216,94
728	38441,60	39246,64
729	38587,80	38979,67
730	37496,20	38790,19
731	38202,20	38036,58

Result No	d _t	y _t
732	37741,70	38362,50
733	37870,60	37914,19
734	37631,60	38289,95
735	37716,70	37903,68
736	37960,10	38025,49
737	37729,40	38113,93
738	38210,20	38093,01
739	38353,10	38398,30
740	38919,50	38497,32
741	39139,10	39074,56
742	39015,90	39296,98
743	39220,20	39393,22
744	39837,30	39439,29
745	39777,70	39810,16
746	39790,70	39999,62
747	40665,40	40113,57
748	41362,50	40536,99
749	41722,40	41210,71
750	41905,40	41830,58
751	43628,80	42024,81
752	44076,90	43102,23
753	42622,90	43756,42
754	43645,20	43325,29
755	44465,70	43347,82
756	43851,40	43657,54
757	44434,50	44034,41
758	45746,20	44218,97
759	45784,10	44840,70
760	45315,20	45440,23
761	44891,30	45327,34
762	44590,20	44661,65
763	45250,70	44261,03
764	44841,00	44614,61
765	44228,00	44542,68
766	44855,60	44286,23
767	44653,00	44287,97
768	43842,70	44261,66
769	44117,50	43993,99
770	44772,90	43784,91
771	44046,30	44117,67
772	43507,50	44065,82
773	43804,00	43647,60
774	45361,30	43387,57
775	46244,30	44470,39

Result		
No	d _t	y _t
776	46689,00	45564,23
777	46710,90	46327,71
778	46265,40	46286,66
779	46553,60	45913,12
780	46838,10	45887,37
781	47728,50	46023,99
782	47015,90	46794,12
783	47493,00	46560,05
784	46890,80	46810,83
785	46366,20	46191,53
786	45997,10	46007,60
787	43889,80	45417,54
788	42340,40	44056,34
789	42863,40	42631,50
790	42521,90	42197,14
791	44346,00	42221,62
792	42906,70	43764,21
793	43236,70	43089,04
794	44051,30	43470,15
795	44688,10	43308,36
796	44426,30	44300,23
797	44399,40	44404,41
798	44328,80	44290,71
799	44531,20	44033,94
800	43273,90	44197,72
801	42710,50	43446,97
802	41742,10	42858,39
803	42507,00	41768,39
804	42941,70	42172,99
805	42911,30	42520,32
806	44028,40	43004,28
807	44070,90	43638,55
808	44088,60	43823,50
809	43710,60	44116,96
810	44284,20	43642,02
811	43099,30	43907,45
812	42890,30	43204,97
813	42505,00	43014,32
814	41919,30	42309,98
815	42212,00	42063,59
816	41860,70	42063,61
817	42864,90	41851,91
818	43732,50	42607,68
819	43872,80	43243,38

Result		
No	d _t	y _t
820	45075,90	43857,11
821	45278,40	44626,72
822	45352,50	44870,36
823	44745,50	45209,52
824	43752,00	44621,75
825	43880,40	43829,94
826	44030,40	43520,80
827	44413,60	43555,03
828	44647,80	44086,94
829	44251,40	44328,66
830	44212,80	44191,21
831	44712,90	44041,07
832	44563,30	44198,87
833	43599,00	44303,99
834	43713,20	43790,73
835	41970,80	43486,11
836	40268,70	42221,77
837	41044,10	40969,57
838	40439,20	40610,16
839	39643,70	40368,39
840	36351,10	40270,26
841	37235,50	37646,46
842	36100,70	37340,44
843	36730,20	36119,37
844	38593,50	37107,03
845	38908,60	37987,35
846	37860,80	39033,71
847	38132,20	38822,90
848	38395,20	38460,69
849	39285,80	38354,36
850	37964,00	39275,00
851	37464,40	38651,52
852	36709,60	38193,80
853	35338,70	37058,73
854	34802,60	36114,29
855	34330,30	35327,72
856	32384,40	34653,18
857	32899,70	33383,78
858	33627,40	33200,55
859	34048,00	33300,61
860	34807,70	34206,41
861	34601,40	34934,43
862	33762,00	34987,75
863	34229,00	34545,99

Result			Test		
No	d _t	y _t	Result No	d _t	y _t
864	33132,30	34455,98	1	51643,80	50491,00
865	31950,60	33658,58	2	51112,00	49905,27
866	32470,40	32914,49	3	53325,30	49497,65
867	33207,10	32570,72	4	52935,80	50677,60
868	34031,10	32985,93	5	55625,40	50852,21
869	35453,30	34033,19	6	54930,70	52723,14
870	35456,50	35295,49	7	54831,90	52323,59
871	36481,20	35766,29	8	52512,40	52676,38
872	35385,00	36708,08	9	51561,90	50647,24
873	35698,70	35992,06	10	51459,20	49784,48
874	36202,20	36219,24	11	52824,90	49127,41
875	36148,40	36126,88	12	51299,30	50280,78
876	35955,80	36500,30	13	51393,60	49922,31
877	35815,50	36447,77	14	50716,40	49929,25
878	35010,50	36203,22	15	50429,90	48943,67
879	33831,70	35605,09	16	50708,20	49027,51
880	32702,90	34648,63	17	52070,60	48972,83
881	33618,00	33446,58	18	49974,80	49916,48
882	33554,40	33556,01	19	49186,40	49135,61
883	35311,00	33597,63	20	50272,50	48415,46
884	34988,80	35171,66	21	49880,90	48134,47
885	34959,00	35217,98	22	47714,10	48501,68
886	35264,40	35646,26	23	44473,30	47547,58
887	35984,50	35436,84	24	46576,90	44742,15
888	36747,30	36025,54	25	46148,80	44927,63
889	36101,90	36789,38	26	45265,00	44968,39
890	36067,90	36705,60	27	46882,00	45556,31
891	35742,80	36609,89	28	47388,60	45761,75
892	35721,60	36071,09	29	46824,00	46341,35
893	35262,90	36086,56	30	47914,40	46674,70
894	36159,60	35699,91	31	47750,70	46938,36
895	35967,50	36221,45	32	48082,20	46845,20
896	36535,70	36188,62	33	50198,60	47371,30
897	37563,30	36848,14	34	49936,90	48402,72
898	37389,30	37435,05	35	50032,60	48816,68
899	37418,10	37766,99	36	49421,40	49163,40
900	37631,10	37921,90	37	49601,40	48277,38
901	37806,50	37821,86	38	49050,40	48330,95
902	38433,40	38028,70	39	48548,90	47901,69
903	37885,30	38530,57	40	49296,20	47667,97
904	37384,80	38333,39	41	49233,10	47843,46
905	37164,90	38011,48	42	49680,50	48001,55
906	37130,80	37477,77	43	50620,90	48520,36

Result No	d_t	y_t
44	50536,50	48973,21
45	50500,90	49231,03
46	53884,10	49270,58
47	53543,10	50919,82
48	53882,10	51435,40
49	53580,70	52160,46
50	52893,20	51227,19
51	54245,80	50930,77
52	54390,20	51393,06
53	54044,20	51696,00
54	54198,00	51937,15
55	54733,30	51654,44
56	54164,90	51878,60
57	54915,90	51791,29
58	56793,00	52131,66
59	56279,10	53037,14
60	57910,60	53390,84
61	57418,00	54233,34
62	58053,40	53789,87
63	58231,90	54378,53
64	57185,40	54137,66
65	57931,90	53861,40
66	56268,20	53914,27
67	55486,80	53007,67
68	53969,80	52647,95
69	55752,20	51226,44
70	55638,90	52162,79
71	55728,60	52389,39
72	56446,60	53066,25
73	56774,30	53022,21
74	57615,70	53369,41
75	57371,30	53947,17
76	56855,10	53869,84
77	56064,30	53616,50
78	56906,00	52873,39
79	56076,40	53131,78
80	55160,80	52865,08
81	53689,10	52549,85
82	54084,00	51235,36
83	54719,00	51202,37
84	55664,90	51599,09
85	54743,00	52645,11
86	54304,50	52363,36
87	53262,90	51952,47

Result No	d_t	y_t
88	53577,80	50910,71
89	52615,60	51021,49
90	52199,30	50479,47
91	52331,30	50359,16
92	52682,50	50094,25
93	51452,30	50477,46
94	53202,80	49987,47
95	53181,20	50737,40
96	54213,80	50778,36
97	54320,00	51936,65
98	54013,30	51792,85
99	55521,20	51833,80
100	56186,90	52347,77
101	56490,60	52913,44
102	56518,60	53514,31
103	56271,30	53348,09
104	56766,20	53119,03
105	55239,00	53257,45
106	54911,70	52515,89
107	53603,40	52179,35
108	54223,60	51030,62
109	53847,40	51425,73
110	55510,50	51201,57
111	55380,70	52435,33
112	55373,20	52486,84
113	55233,00	52821,61
114	55698,40	52335,36
115	55538,10	52581,77
116	54708,40	52568,28
117	53541,30	52209,55
118	52529,90	51273,73
119	52569,50	50371,49
120	53235,90	50183,35
121	52730,70	50668,98
122	52351,00	50780,34
123	51920,60	50575,27
124	51480,90	50001,00
125	50377,30	49715,83
126	49093,80	49003,53
127	48902,80	48038,10
128	48657,50	47534,90
129	45544,10	47362,89
130	44593,70	45704,97
131	42539,50	44397,30

Result			
No	d_t	y_t	
132	45010,70	42274,11	
133	45497,20	43863,47	
134	43706,70	44480,41	
135	44572,70	44522,75	
136	44304,40	44194,75	
137	42697,60	43705,04	
138	44452,10	43245,58	
139	45719,90	43709,73	
140	44350,80	44592,58	
141	43317,50	44810,52	
142	41866,40	43740,21	
143	41957,90	41970,97	
144	41342,80	41755,58	
145	43539,90	41268,38	
146	44752,50	42861,53	

Result			
No	d_t	y_t	
147	45493,70	43967,74	
148	44305,30	45373,41	
149	45741,70	44611,31	
150	46249,30	45118,80	
151	45876,70	45321,35	
152	46446,60	45807,28	
153	45592,50	45853,74	
154	44895,00	45259,45	
155	45524,50	44845,34	
156	46260,30	44748,62	
157	45823,30	45390,37	
158	44776,90	45594,02	
159	43343,60	44866,83	
160	42923,00	43457,27	

APPENDIX_C

LTS RESULTS FOR TRAINING AND TEST

Training			Result		
Result					
No	d_t	y_t	No	d_t	y_t
1	10837,5	23007,64	37	10128,9	13029,18
2	10357,3	13040,93	38	10616,1	12426,74
3	9752,86	10248,23	39	10815,5	12369,49
4	10161,2	10620,03	40	10841,8	12440,62
5	10225,8	12381,9	41	10961,3	12545,07
6	10204,1	12091,3	42	10817,5	12672,43
7	10412,7	12193,34	43	10744,7	12595,44
8	10124,9	12293,73	44	10614,1	12541,02
9	10280,7	12184,73	45	10666,6	12459,39
10	10467,9	12213,16	46	10604,3	12450,35
11	10348,3	12299,88	47	9482,92	12433,52
12	10590,3	12289,05	48	10581,5	11955,66
13	10570,4	12394,43	49	9938,21	12214,4
14	10544,7	12409,74	50	9644,31	12068,52
15	10881,9	12406,25	51	9406,56	11923,22
16	10825,9	12547,99	52	8892,65	11761,25
17	10931,1	12573,16	53	9187,88	11449,05
18	10742,9	12634,36	54	9408,46	11505,96
19	10725,7	12563,07	55	9572,25	11624,97
20	10945,7	12513,08	56	9631,43	11766,07
21	11032	12596,38	57	9475,09	11848,38
22	11122	12671,98	58	9773,83	11784,25
23	10658,3	12752,28	59	9804,88	11873,85
24	10659,9	12567,46	60	10153,2	11923,49
25	10921,8	12476,28	61	10415	12094,74
26	11013,8	12555,68	62	10743	12272,63
27	11302,5	12649,79	63	10512,9	12468,66
28	11775,5	12833,32	64	10886,2	12442,53
29	11607,3	13096,41	65	10629,7	12562,04
30	11669,3	13118,53	66	10565,9	12490,64
31	11754	13138,75	67	11103,4	12431,41
32	11392,6	13155,41	68	11169	12641,53
33	11272,7	12997,4	69	11366	12752,63
34	11291,9	12891,15	70	11219,2	12904,73
35	11486,8	12846,08	71	11254	12871,9
36	11574,4	12931,66	72	11504,7	12846,29

Result No	d_t	y_t
73	11405,2	12952,31
74	11119,6	12952,06
75	11341,4	12831,23
76	11311,1	12860,46
77	11436,2	12860,83
78	11510	12937,63
79	11467,6	13000,43
80	11300,7	12991,99
81	11112,1	12915,87
82	10962,9	12790,18
83	10676,3	12676,52
84	10783,9	12517,04
85	10640,4	12510,95
86	10712,9	12460,02
87	10590,7	12482,16
88	10393,3	12443,37
89	10229,4	12336,4
90	10306,3	12228,85
91	10427	12216,46
92	10540,9	12280,87
93	10695,2	12367,24
94	11056,3	12466,83
95	11125,3	12652,8
96	11088,9	12754,55
97	11437,4	12768,64
98	11407,1	12907,36
99	11381,4	12941,32
100	11579,3	12948,22
101	11346,5	13024,91
102	11084,7	12941,32
103	11129,7	12799,38
104	10973,4	12750,9
105	10827,8	12668,57
106	10644,7	12595,93
107	10597,3	12487,98
108	10489,2	12422,91
109	10713,9	12366,11
110	11036,7	12447,91
111	11169,2	12630,49
112	11107,5	12766,97
113	10902,5	12787,06
114	10783,9	12677,14
115	10747,5	12567,93
116	10756,8	12514,26

Result No	d_t	y_t
117	10740,2	12511,08
118	10927,8	12514,01
119	10981,2	12597,18
120	10884,4	12655,17
121	10749,8	12635,08
122	10690,9	12559,4
123	10726,6	12492,88
124	10502,9	12489,5
125	10351,8	12403,07
126	10546,9	12305,81
127	10364,9	12347,72
128	10399,7	12298,16
129	10454,9	12305,26
130	10658,8	12324,65
131	10918,6	12417,87
132	10791,4	12580,98
133	10751,5	12583,4
134	10856,9	12553,74
135	10827,3	12570,06
136	10544,5	12566,56
137	10463,8	12454,27
138	10475,2	12364
139	10561,3	12331,28
140	10598,3	12372,29
141	10478,3	12418,54
142	10445	12380,54
143	10572	12344,12
144	10621,2	12380,15
145	11112,1	12423,78
146	11499,9	12660,2
147	11311,1	12925,46
148	11547,4	12941,95
149	11558,5	13027,04
150	11762,3	13034,73
151	11860,1	13134,29
152	11916,1	13226,25
153	11794,9	13271,36
154	11877,5	13231,99
155	11661,2	13237,97
156	11688,9	13144,11
157	11557	13120,66
158	11845,9	13056,54
159	12001,1	13161,9
160	11798	13290,03

Result No	d _t	y _t
161	11735,2	13247,24
162	11623,4	13191,09
163	11509	13096,83
164	11611,8	13019,02
165	11652,8	13047,13
166	11637,1	13080,65
167	11671,8	13095,61
168	11636,5	13113,43
169	11631,8	13096,68
170	11581,3	13089,52
171	11946,7	13063,88
172	12317,7	13217,26
173	12507	13456,86
174	12715,2	13644,75
175	12662,5	13801,7
176	13005	13806,83
177	12958,2	13954,06
178	13419,3	13987,56
179	13663,5	14215,25
180	13845	14423,47
181	14031,1	14580,63
182	13798,3	14725,45
183	13935,7	14634,01
184	13758,8	14654,58
185	13255,9	14567,96
186	13055,9	14293,1
187	13444	14090,65
188	13880,5	14192,94
189	14210,2	14491,4
190	15719,7	14803,64
191	15482,7	15674,61
192	15147,8	15884,31
193	14907	15748,84
194	15420,6	15483,69
195	15064,8	15595,88
196	15023	15542,61
197	15382,2	15501,42
198	15596,8	15648,73
199	15381,9	15815,72
200	15358,7	15806,17
201	15595,3	15752,75
202	15300,4	15829,89
203	14829,5	15723,93
204	14866,3	15446,94

Result No	d _t	y _t
205	14564,8	15332,6
206	14673,4	15144,67
207	15379,7	15164,82
208	15754,3	15547,78
209	16341,2	15910,39
210	16268,3	16380,94
211	16408,3	16483,1
212	15536,8	16543,34
213	15708,1	16075,46
214	15528,6	15951,3
215	15224,1	15832,69
216	15771,4	15657,2
217	16056,6	15905,92
218	16080,7	16142,12
219	15687,1	16284,74
220	15760,5	16105,86
221	15780,2	16017,26
222	14617,5	16002,58
223	16007,6	15416,75
224	16242	15900,29
225	16389,6	16239,41
226	16271,9	16513,45
227	16504,8	16537,45
228	16913,3	16551,81
229	16861	16819,54
230	16614,7	16901,97
231	16551,6	16791,2
232	16955,2	16670,18
233	17410	16836,33
234	17208,5	17192,1
235	17230,8	17237,98
236	17742,4	17232,14
237	18206,1	17472,97
238	18387,6	17846,72
239	18242	18127,79
240	18239,9	18112,81
241	17643,7	18049,61
242	17996,8	17667,84
243	17973,9	17719,99
244	18292,9	17752,18
245	18625	17973,19
246	19147,7	18271,07
247	19696,6	18662,81
248	19013,8	19153,94

Result No	d_t	y_t
249	19382,8	18904,39
250	19404,9	18969,23
251	19926,5	18972,39
252	19558,8	19315,12
253	19460,3	19270,09
254	18818,6	19130,17
255	18952,2	18678,79
256	18301,2	18562,27
257	17788,6	18188,45
258	18832,8	17759,64
259	18899,9	18212,39
260	18518,1	18469,48
261	18356,5	18410,52
262	17899,5	18223,62
263	17902	17816,25
264	17282,3	17708,89
265	17259,3	17345,09
266	17033,8	17199,03
267	16965,8	17040,75
268	17641	16956,9
269	17418,5	17334,73
270	18000,3	17366,89
271	18885,9	17715,89
272	19000,5	18337,74
273	19324,5	18645,14
274	19010,1	18954,88
275	19478,7	18798,72
276	18606	18976,45
277	18603,8	18543,65
278	18284	18351,73
279	18497,7	18098,91
280	18707,1	18131,76
281	18771,6	18338,03
282	18889,2	18444,89
283	18786,4	18564,75
284	19356,6	18517,55
285	19171,9	18828,17
286	19015,5	18850,26
287	19165,7	18757,24
288	19495,4	18783,21
289	19488,5	18972,2
290	19798,8	19089,51
291	19381,4	19308,44
292	19364,4	19116,84

Result No	d_t	y_t
293	19526,5	19008,49
294	19321,6	19059,6
295	19294,5	18967,61
296	19611,1	18943,61
297	20023,8	19099,44
298	20167,2	19424,67
299	20185,8	19666,12
300	20347,8	19744,87
301	20472,6	19831,99
302	20836,1	19927,58
303	20887	20197,35
304	20030,7	20334,85
305	20190,8	19836,11
306	20322,2	19696,96
307	20485	19716,7
308	20330,9	19890,36
309	20272,9	19901,97
310	20040,1	19816,1
311	19419,8	19633,61
312	19505,2	19184,73
313	19259,5	19066,95
314	19104,4	18892,66
315	18678,2	18774,54
316	18687,5	18494,24
317	19269,5	18372,01
318	19935,7	18699,98
319	19528,1	19267,57
320	19270,4	19273,18
321	19431,5	19052,66
322	18586,5	18992,91
323	18217,1	18484,72
324	18229,7	18109,07
325	17737,9	17956,25
326	18022,7	17653,97
327	17678,3	17758,06
328	18244,7	17600,86
329	18272,4	17872,41
330	17624,1	18021,78
331	17002	17691,61
332	16807,7	17196,22
333	17102,5	16847,97
334	17144,7	16932,33
335	16645,9	17061,08
336	16531,3	16853,59

Result No	d _t	y _t
337	15922,4	16675,02
338	16124,3	16259,39
339	16334,2	16230,11
340	16628,8	16370,15
341	17167,4	16609,93
342	16791,1	17022,31
343	17235,5	16944,01
344	17164	17129,95
345	17327,9	17137,02
346	17081,1	17229,57
347	16766,8	17142,25
348	16867,5	16894,3
349	17044,4	16860,3
350	17708,2	16950,27
351	18020,3	17395,18
352	17604,1	17762,82
353	17615,6	17646,16
354	17786,4	17553,03
355	17664,5	17571,89
356	17079,8	17544,26
357	17230,5	17227,14
358	17099	17150,78
359	16901,4	17057,9
360	16964,1	16952,4
361	16785,4	16957,63
362	16752,8	16845,58
363	16820	16805,15
364	16888,6	16827,59
365	17355,2	16877,05
366	17710,4	17169,61
367	17735,5	17485,85
368	17967,6	17621,22
369	18290,3	17776,02
370	18416,4	17985,1
371	18554,8	18142,15
372	18237,6	18279,18
373	18296,7	18118,31
374	18076,9	18065,75
375	18327,1	17918,2
376	18368,4	18013,52
377	18493	18099,56
378	18635,2	18202,3
379	18966,2	18328,54
380	19157,3	18550,95

Result No	d _t	y _t
381	18945	18758,87
382	18881,3	18700,4
383	18779,8	18610,18
384	18628,7	18491,48
385	18904,3	18368,7
386	18645,4	18499,67
387	18774,6	18407,46
388	19018,6	18452,01
389	19111,4	18606,66
390	19380,9	18723,26
391	19698,1	18946,17
392	19427,4	19197,32
393	19048,5	19125,35
394	19344,3	18847,41
395	19187,6	18878,05
396	19248,1	18816,35
397	19392,6	18868,84
398	18908,6	18969,1
399	18775,5	18704,57
400	18826	18527,82
401	18832,2	18470,9
402	19459,7	18479,53
403	19268,1	18892,5
404	19187,8	18941,07
405	19286,3	18896,59
406	19363,7	18901,88
407	19663,6	18931,89
408	19558	19162,64
409	19572,3	19183,3
410	19855,3	19183,23
411	20218,4	19337,26
412	20512,2	19618,79
413	20525,9	19932,68
414	20775	20043,88
415	20851,6	20203,09
416	21119,2	20291,47
417	21468,3	20488,79
418	21398	20785,99
419	21004,1	20844,05
420	21060,2	20599,28
421	21705,3	20494,5
422	21616,5	20863,12
423	21704,8	21008,74
424	20833,2	21127,36

Result No	d_t	y_t
425	20373,4	20561,32
426	21192,9	20008
427	21491,4	20324,6
428	22276,7	20706,88
429	22307,4	21445,71
430	22083	21712,69
431	22293,8	21584,1
432	22219,9	21630,92
433	21953,5	21568,03
434	21722,5	21409,06
435	21987,7	21187,09
436	21612,5	21252,83
437	22287,1	21077,41
438	22432,2	21457,66
439	22951,4	21709,25
440	22787,3	22148,82
441	22289,9	22213,64
442	22630	21835,38
443	22318,9	21886,82
444	22477,1	21699,22
445	22334,3	21780,56
446	22550,9	21722,37
447	22220,8	21818,87
448	22201,5	21671,69
449	22244	21576,47
450	21907,8	21572,35
451	22142,5	21356,29
452	22565,8	21444,68
453	22899,9	21748,54
454	22857,9	22118,29
455	23215,6	22245,55
456	23437,8	22472,54
457	23006,5	22684,55
458	23215,6	22479,55
459	22616	22514,47
460	22544,3	22100,37
461	22618	21905,54
462	22186,9	21899,9
463	22104,7	21627,65
464	22566,4	21506,69
465	23132,6	21736,6
466	23176,7	22239,1
467	22931,4	22510,6
468	23472,4	22403,99

Result No	d_t	y_t
469	23516,3	22650,74
470	23464,5	22776,8
471	23293,2	22820,79
472	22799,2	22696,86
473	22486,2	22270,62
474	22560,9	21912,15
475	23150,1	21831,42
476	23008,1	22234,65
477	23049,5	22357,13
478	23075,6	22416,97
479	22625,4	22406,64
480	22679,9	22084,3
481	22943,7	22011,27
482	23634,8	22149,41
483	23417,9	22702,72
484	23289,7	22814,1
485	23935,2	22718,48
486	24360,6	23057,31
487	24341,4	23482,95
488	24044,6	23690,78
489	24525,3	23512,57
490	24430,8	23692,64
491	24537,7	23717,93
492	24590,8	23828,61
493	24935,8	23893,53
494	24971,7	24123,15
495	25445,2	24267,59
496	25042	24633,87
497	24422,9	24485,94
498	24561,9	23960,01
499	25308,3	23818,12
500	25604,7	24288,4
501	26110,2	24789,14
502	26271,3	25351,31
503	26493	25611,94
504	26362,7	25813,06
505	26863,2	25778,64
506	26813,1	26081,71
507	26918,1	26174,41
508	26469,4	26278,15
509	26860	25980,13
510	27056	26095,18
511	27302,7	26316,19
512	27074,1	26602,6

Result No	d _t	y _t
513	27330,4	26559,2
514	27849,8	26658,56
515	27936,5	27075,08
516	27554,8	27320,55
517	27813,2	27139,53
518	28201,7	27178,6
519	28269,7	27463,51
520	27528,1	27677,32
521	27308,8	27220,34
522	27736,3	26798,38
523	28003,6	26931,36
524	28164,1	27259,01
525	27661,6	27572,31
526	27000,4	27277,26
527	27293,2	26613,75
528	26864,3	26545,68
529	26657,4	26260,72
530	26921,3	26070,82
531	27354,6	26182,89
532	28031,5	26537,14
533	28396,2	27238,36
534	27768,5	27768,52
535	27226,4	27462,59
536	27558,9	26860,43
537	27663,2	26806,42
538	27789,9	26927,1
539	27698,3	27157,69
540	27746,4	27163,6
541	27519,8	27148,63
542	27572,8	26982,18
543	26936,8	26949,17
544	26547,2	26486,51
545	25331,7	26016,2
546	24476	24979,42
547	25348,5	23987,12
548	24636,7	24266,87
549	25218,2	23998,4
550	24439,3	24390,14
551	25068,5	23968,34
552	25502,6	24180,84
553	24842,2	24637,65
554	24479,7	24343,02
555	24600,9	23987,47
556	25557,8	23824,45

Result No	d _t	y _t
557	25740,8	24483,88
558	25445,1	24978,2
559	25682,5	24941,07
560	26056,6	24996,91
561	25831,2	25227,86
562	25786,5	25216,48
563	25370,3	25172,28
564	25078	24808,2
565	25293,2	24456,47
566	24542	24497,2
567	23853,3	24020,4
568	23285,9	23385,92
569	24143,9	22732,9
570	24175,9	23079,03
571	24419,4	23369,36
572	24730,8	23689,57
573	24798,1	23987,17
574	24484	24082,33
575	24070,1	23921,23
576	23519,6	23523,53
577	23591,6	22975,1
578	24253	22829,46
579	24137,9	23275,75
580	24560,2	23439,72
581	25099,9	23796,32
582	24950,8	24251,65
583	24702,2	24311,38
584	24688,3	24156,11
585	24662,9	24007,79
586	25114,4	23931,53
587	25325,7	24260,04
588	24921,3	24555,74
589	24846,1	24383,5
590	25205,5	24221,23
591	25464,9	24366,55
592	24329,1	24650,67
593	24140,9	24009,78
594	24119,8	23560,2
595	24054,1	23339,01
596	24453,1	23287,76
597	24977,8	23628,14
598	25236,5	24099,39
599	25230,8	24481,22
600	25799,1	24603,72

Result No	d _t	y _t
601	26051,6	24983,1
602	25533,1	25293,24
603	25478	25052,35
604	25779,8	24869,71
605	25500	24960,28
606	25725,2	24853,77
607	25610	25002,25
608	25929,9	24946,83
609	26209,4	25147,97
610	26579,7	25449,59
611	26529,3	25816,41
612	26709,2	25927,55
613	26746,4	26046,99
614	26779,3	26096,47
615	27021,5	26128,53
616	27033,4	26320,45
617	26597,8	26391,91
618	26811,4	26107,27
619	27135,9	26117,74
620	26957,3	26351,82
621	27616,9	26363
622	27702,3	26846,96
623	27377,6	27063,51
624	27781,4	26911,54
625	27689,5	27110,95
626	27842,4	27078,75
627	27808,1	27219,76
628	27689,2	27245,01
629	28061,9	27131,67
630	28500,9	27371,56
631	28427,3	27785,5
632	28402,7	27921
633	28675,4	27925,51
634	28713,5	28066,56
635	28992,1	28152,78
636	29188,1	28414,07
637	29273,3	28644,34
638	28730,7	28779,34
639	29164,8	28418,27
640	29343	28549
641	29615,3	28745,09
642	29776,7	29067,03
643	29543,5	29324,85
644	29727,1	29185,82

Result No	d _t	y _t
645	30123,6	29251,23
646	29945,4	29555,86
647	29924,8	29569,74
648	29701	29556,44
649	29683,2	29331,51
650	29111,8	29221,76
651	28175,9	28784,89
652	28074,9	27913,12
653	28257,7	27496,64
654	27906,3	27510,17
655	28000	27371,85
656	28456,9	27416,32
657	28951,4	27731,28
658	29191,6	28248,41
659	29372,2	28662,78
660	29814,2	28902,79
661	30020,4	29268,59
662	30015,1	29546,1
663	30908	29641,15
664	31948	30308,37
665	31701,6	31344,14
666	31879,5	31589,68
667	31832,5	31738,25
668	31385	31628,02
669	31485,4	31233,66
670	32202,7	31186,45
671	32711,1	31692,79
672	32541,1	32345,48
673	32632,4	32496,56
674	33271,1	32531,42
675	33294,3	32955,81
676	33221,2	33168,62
677	33719,3	33211,53
678	33863,8	33537,58
679	33465,6	33752,07
680	33250,5	33564,48
681	33516	33276,72
682	33319,2	33316,88
683	32745	33238,35
684	33396,2	32808,33
685	33333,2	33094,79
686	34300,9	33176,2
687	35624,8	34004
688	34775,7	35336,21

Result No	d _t	y _t
689	33510,4	35178,79
690	33413,6	34080,68
691	33506	33374,34
692	34040,2	33203,87
693	33118,4	33754,86
694	32054,3	33328,48
695	31440	32267,95
696	31850,7	31324,99
697	31586,8	31301,83
698	30766,7	31279,89
699	31403,9	30710,21
700	31428,6	30915,36
701	31845,7	31015,44
702	31670	31466,49
703	31474,4	31511,9
704	31273,3	31291,59
705	31038,5	31051,33
706	31964	30758
707	32792	31384,56
708	33152,1	32305,73
709	33830,1	32977,56
710	33749,4	33692,09
711	33848,3	33790,9
712	34709,7	33855,19
713	34096,3	34492,4
714	34171,5	34272,97
715	34324	34242,12
716	34866,6	34273,83
717	35127,3	34696,8
718	35314,3	35147,35
719	35655	35414,34
720	35254,1	35735,1
721	36179,3	35515,83
722	36907,8	36103,51
723	36759,9	36880,47
724	36621,5	37097,9
725	37495,2	37036,66
726	38088,7	37525,1
727	38296,9	38190,4
728	38573,7	38654,19
729	39130,7	38968,96
730	38917,8	39398,29
731	38441,6	39409,9
732	38587,8	39041,01

Result No	d _t	y _t
733	37496,2	38938,32
734	38202,2	38096,71
735	37741,7	38326,31
736	37870,6	38116,37
737	37631,6	38160,64
738	37716,7	38038,37
739	37960,1	37983,18
740	37729,4	38206,94
741	38210,2	38112,93
742	38353,1	38439,97
743	38919,5	38653,38
744	39139,1	39156,3
745	39015,9	39515,09
746	39220,2	39512,3
747	39837,3	39625,34
748	39777,7	40072,29
749	39790,7	40237,72
750	40665,4	40301,17
751	41362,5	40885,96
752	41722,4	41602,3
753	41905,4	42165,13
754	43628,8	42442,49
755	44076,9	43616,53
756	42622,9	44372,54
757	43645,2	43693,05
758	44465,7	43943,74
759	43851,4	44496,09
760	44434,5	44459,12
761	45746,2	44819,42
762	45784,1	45643,35
763	45315,2	46050,76
764	44891,3	45927,18
765	44590,2	45458,37
766	45250,7	45026,8
767	44841	45349,07
768	44228	45281,69
769	44855,6	44872,7
770	44653	45063,15
771	43842,7	45010,47
772	44117,5	44547,11
773	44772,9	44497,09
774	44046,3	44873,12
775	43507,5	44658,28
776	43804	44212,92

Result No	d _t	y _t
777	45361,3	44135,62
778	46244,3	45152,22
779	46689	46220,59
780	46710,9	46880,78
781	46265,4	47025,16
782	46553,6	46689,04
783	46838,1	46700,62
784	47728,5	46885,36
785	47015,9	47523,53
786	47493	47376,08
787	46890,8	47525,11
788	46366,2	47193,03
789	45997,1	46734,31
790	43889,8	46361,52
791	42340,4	44866,51
792	42863,4	43278,29
793	42521,9	43003,57
794	44346	42845,19
795	42906,7	44203,67
796	43236,7	43803,21
797	44051,3	43751,15
798	44688,1	44219,09
799	44426,3	44803,19
800	44399,4	45001,94
801	44328,8	44909,4
802	44531,2	44765,63
803	43273,9	44847,82
804	42710,5	44106,09
805	41742,1	43393,17
806	42507	42441,89
807	42941,7	42642,28
808	42911,3	43168,45
809	44028,4	43401,64
810	44070,9	44216,68
811	44088,6	44479,08
812	43710,6	44595,35
813	44284,2	44334,59
814	43099,3	44525,78
815	42890,3	43885,04
816	42505	43473,31
817	41919,3	43043,22
818	42212	42498,33
819	41860,7	42585,06
820	42864,9	42378,56

Result No	d _t	y _t
821	43732,5	43033,5
822	43872,8	43894,41
823	45075,9	44314,82
824	45278,4	45214,54
825	45352,5	45588,54
826	44745,5	45756,65
827	43752	45383,38
828	43880,4	44501,62
829	44030,4	44246,12
830	44413,6	44294,1
831	44647,8	44666,96
832	44251,4	44993,51
833	44212,8	44816,8
834	44712,9	44687,43
835	44563,3	44929,22
836	43599	44967,3
837	43713,2	44382,21
838	41970,8	44153,94
839	40268,7	42895,5
840	41044,1	41258,36
841	40439,2	41166,37
842	39643,7	40821,86
843	36351,1	40337,49
844	37235,5	37697,99
845	36100,7	37147,89
846	36730,2	36294,93
847	38593,5	36657,54
848	38908,6	38332,58
849	37860,8	39142,03
850	38132,2	38767,89
851	38395,2	38546,78
852	39285,8	38567,41
853	37964	39365,35
854	37464,4	38782,86
855	36709,6	38051,51
856	35338,7	37139,37
857	34802,6	35785,78
858	34330,3	34981,59
859	32384,4	34333,07
860	32899,7	32737,88
861	33627,4	32553,56
862	34048	33087,92
863	34807,7	33798,68
864	34601,4	34727,23

Result No	d _t	y _t
865	33762	34774,41
866	34229	34098,37
867	33132,3	34106,98
868	31950,6	33281,63
869	32470,4	32133,98
870	33207,1	32062,98
871	34031,1	32641,42
872	35453,3	33701,42
873	35456,5	35192,52
874	36481,2	35671,56
875	35385	36531,69
876	35698,7	35940,06
877	36202,2	35837,71
878	36148,4	36180,08
879	35955,8	36290,55
880	35815,5	36277,57
881	35010,5	36044,78
882	33831,7	35338,98
883	32702,9	34185,05
884	33618	32867,78
885	33554,4	33091,74
886	35311	33311,99
887	34988,8	34846,98
888	34959	35211,38
889	35264,4	35200,69
890	35984,5	35349,32
891	36747,3	35857,66
892	36101,9	36751,09
893	36067,9	36580,51
894	35742,8	36387,31
895	35721,6	35982
896	35262,9	35827,64
897	36159,6	35499,7
898	35967,5	36026,43
899	36535,7	36146,67
900	37563,3	36624,79

Test Result No	d _t	y _t
1	51643,8	47805,88
2	51112	47830,4
3	53325,3	48505,37

Result No	d _t	y _t
4	52935,8	48356,51
5	55625,4	49147,24
6	54930,7	48538,19
7	54831,9	49063,3
8	52512,4	48285,23
9	51561,9	48593,29
10	51459,2	48502,49
11	52824,9	48998,3
12	51299,3	48559,26
13	51393,6	48481,23
14	50716,4	47747,65
15	50429,9	48088,57
16	50708,2	47974
17	52070,6	48244,11
18	49974,8	47719,49
19	49186,4	47620,03
20	50272,5	47340,64
21	49880,9	47691,72
22	47714,1	47343,46
23	44473,3	45938,04
24	46576,9	46403,02
25	46148,8	46156,48
26	45265	46614,95
27	46882	45736,05
28	47388,6	45610,38
29	46824	45936,6
30	47914,4	45834,63
31	47750,7	45685,94
32	48082,2	46364,23
33	50198,6	46703,74
34	49936,9	46788,32
35	50032,6	47157,73
36	49421,4	46591,6
37	49601,4	47097,72
38	49050,4	47049,11
39	48548,9	47161,42
40	49296,2	47183,05
41	49233,1	47143,91
42	49680,5	47378,36
43	50620,9	47313,24
44	50536,5	47371,39
45	50500,9	47457,57
46	53884,1	48114,22
47	53543,1	48118,36

Result No	d_t	y_t
48	53882,1	48676,94
49	53580,7	48061,89
50	52893,2	48432,79
51	54245,8	48857,63
52	54390,2	48925,42
53	54044,2	49101,33
54	54198	52583,32
55	54733,3	52752,89
56	54164,9	52628,09
57	54915,9	52895,44
58	56793	53752,93
59	56279,1	53904,24
60	57910,6	54569,55
61	57418	54555,16
62	58053,4	54745,01
63	58231,9	54889,58
64	57185,4	54508,27
65	57931,9	54650,33
66	56268,2	54046,63
67	55486,8	53509,63
68	53969,8	52653,07
69	55752,2	53075,09
70	55638,9	53345,91
71	55728,6	53519,63
72	56446,6	53846,14
73	56774,3	54019,75
74	57615,7	54456,73
75	57371,3	54502,31
76	56855,1	54282,89
77	56064,3	53852,03
78	56906	53990,27
79	56076,4	53782,8
80	55160,8	53350,08
81	53689,1	52514,4
82	54084	52316,45
83	54719	52637,16
84	55664,9	53243,3
85	54743	53118,49
86	54304,5	52782,37
87	53262,9	52133,07
88	53577,8	52019,99
89	52615,6	51625,01
90	52199,3	51286,57
91	52331,3	51236,27

Result No	d_t	y_t
92	52682,5	51395,43
93	51452,3	50944,95
94	53202,8	51565,83
95	53181,2	51804,27
96	54213,8	52398,66
97	54320	52666,82
98	54013,3	52530,43
99	55521,2	53128,86
100	56186,9	53604,68
101	56490,6	53941,45
102	56518,6	54030,97
103	56271,3	53881,19
104	56766,2	54015,57
105	55239	53464,61
106	54911,7	53091,19
107	53603,4	52363,09
108	54223,6	52369,83
109	53847,4	52314,15
110	55510,5	53034,9
111	55380,7	53302,06
112	55373,2	53349,78
113	55233	53275,54
114	55698,4	53369,58
115	55538,1	53397,16
116	54708,4	53051,14
117	53541,3	52375,94
118	52529,9	51604,74
119	52569,5	51362,27
120	53235,9	51674,7
121	52730,7	51644,74
122	52351	51449,73
123	51920,6	51103,85
124	51480,9	50746,72
125	50377,3	50101,8
126	49093,8	49162,98
127	48902,8	48695,74
128	48657,5	48451,95
129	45544,1	46656,29
130	44593,7	45290,78
131	42539,5	43380,03
132	45010,7	44435,67
133	45497,2	45459,08
134	43706,7	44770,4
135	44572,7	44942,11

Result No	d_t	y_t
136	44304,4	44629,35
137	42697,6	43637,1
138	44452,1	44411,41
139	45719,9	45476,66
140	44350,8	45198,82
141	43317,5	44333,25
142	41866,4	42751,17
143	41957,9	42253,86
144	41342,8	41846,4
145	43539,9	43272,25
146	44752,5	44718,24
147	45493,7	45725,6
148	44305,3	45279,9

Result No	d_t	y_t
149	45741,7	45747,99
150	46249,3	46262,75
151	45876,7	46297,26
152	46446,6	46639,28
153	45592,5	46113,51
154	44895	45500,83
155	45524,5	45639,43
156	46260,3	46178,47
157	45823,3	46243,74
158	44776,9	45564,51
159	43343,6	44244,38
160	42923	43422,88

APPENDIX_D

RNN RESULTS FOR TRAINING AND TEST

Training			Result		
Result					
No	d_t	y_t	No	d_t	y_t
1	10837,50	30736,34	37	10128,90	12758,89
2	10357,30	23897,55	38	10616,10	12567,65
3	9752,86	12014,62	39	10815,50	12564,44
4	10161,20	10570,94	40	10841,80	12468,34
5	10225,80	10441,08	41	10961,30	12517,12
6	10204,10	12822,08	42	10817,50	12435,00
7	10412,70	16757,68	43	10744,70	12541,54
8	10124,90	13753,29	44	10614,10	12557,75
9	10280,70	14592,62	45	10666,60	12392,31
10	10467,90	12312,59	46	10604,30	12511,17
11	10348,30	12292,30	47	9482,92	12509,87
12	10590,30	12401,00	48	10581,50	12318,18
13	10570,40	12415,30	49	9938,21	12376,64
14	10544,70	12418,81	50	9644,31	12247,11
15	10881,90	12470,20	51	9406,56	12241,90
16	10825,90	12464,46	52	8892,65	12054,37
17	10931,10	12525,35	53	9187,88	12081,25
18	10742,90	12580,32	54	9408,46	11994,78
19	10725,70	12527,77	55	9572,25	11893,53
20	10945,70	12577,26	56	9631,43	12071,10
21	11032,00	12562,45	57	9475,09	12011,67
22	11122,00	12581,04	58	9773,83	12040,68
23	10658,30	12630,79	59	9804,88	12114,41
24	10659,90	12559,05	60	10153,20	12116,16
25	10921,80	12562,13	61	10415,00	12245,09
26	11013,80	12537,32	62	10743,00	12306,46
27	11302,50	12569,62	63	10512,90	12421,03
28	11775,50	12619,17	64	10886,20	12428,85
29	11607,30	12732,88	65	10629,70	12512,23
30	11669,30	12808,11	66	10565,90	12535,73
31	11754,00	12820,16	67	11103,40	12552,72
32	11392,60	12889,27	68	11169,00	12582,99
33	11272,70	12930,26	69	11366,00	12651,51
34	11291,90	12844,32	70	11219,20	12702,05
35	11486,80	12805,95	71	11254,00	12655,73
36	11574,40	12837,43	72	11504,70	12770,79

Result			
No	d_t	y_t	
73	11405,20	12755,57	
74	11119,60	12769,83	
75	11341,40	12785,24	
76	11311,10	12763,65	
77	11436,20	12758,38	
78	11510,00	12744,86	
79	11467,60	12740,45	
80	11300,70	12812,05	
81	11112,10	12761,57	
82	10962,90	12702,24	
83	10676,30	12692,42	
84	10783,90	12599,11	
85	10640,40	12557,74	
86	10712,90	12496,05	
87	10590,70	12481,30	
88	10393,30	12424,08	
89	10229,40	12412,23	
90	10306,30	12359,51	
91	10427,00	12341,27	
92	10540,90	12361,70	
93	10695,20	12365,22	
94	11056,30	12409,65	
95	11125,30	12492,71	
96	11088,90	12550,52	
97	11437,40	12604,44	
98	11407,10	12707,17	
99	11381,40	12772,26	
100	11579,30	12797,76	
101	11346,50	12818,84	
102	11084,70	12846,84	
103	11129,70	12768,87	
104	10973,40	12702,43	
105	10827,80	12697,75	
106	10644,70	12606,62	
107	10597,30	12515,77	
108	10489,20	12511,16	
109	10713,90	12429,43	
110	11036,70	12421,78	
111	11169,20	12487,37	
112	11107,50	12548,85	
113	10902,50	12579,04	
114	10783,90	12594,90	
115	10747,50	12603,02	
116	10756,80	12570,05	

Result			
No	d_t	y_t	
117	10740,20	12562,87	
118	10927,80	12545,26	
119	10981,20	12544,05	
120	10884,40	12541,41	
121	10749,80	12538,29	
122	10690,90	12526,94	
123	10726,60	12532,55	
124	10502,90	12525,62	
125	10351,80	12472,17	
126	10546,90	12440,31	
127	10364,90	12426,79	
128	10399,70	12385,78	
129	10454,90	12366,25	
130	10658,80	12360,69	
131	10918,60	12430,66	
132	10791,40	12449,65	
133	10751,50	12479,37	
134	10856,90	12536,60	
135	10827,30	12539,58	
136	10544,50	12564,14	
137	10463,80	12517,56	
138	10475,20	12490,22	
139	10561,30	12473,89	
140	10598,30	12432,15	
141	10478,30	12408,75	
142	10445,00	12418,76	
143	10572,00	12412,49	
144	10621,20	12403,68	
145	11112,10	12427,47	
146	11499,90	12514,21	
147	11311,10	12622,74	
148	11547,40	12691,52	
149	11558,50	12754,49	
150	11762,30	12819,91	
151	11860,10	12925,55	
152	11916,10	12921,45	
153	11794,90	13023,00	
154	11877,50	13014,22	
155	11661,20	12976,20	
156	11688,90	12957,40	
157	11557,00	12941,98	
158	11845,90	12887,58	
159	12001,10	12924,75	
160	11798,00	12921,20	

Result

No	d _t	y _t
161	11735,20	12923,05
162	11623,40	12922,19
163	11509,00	12898,34
164	11611,80	12883,35
165	11652,80	12839,17
166	11637,10	12866,54
167	11671,80	12865,98
168	11636,50	12829,18
169	11631,80	12845,87
170	11581,30	12852,58
171	11946,70	12837,81
172	12317,70	12915,85
173	12507,00	12996,63
174	12715,20	13095,22
175	12662,50	13202,43
176	13005,00	13291,57
177	12958,20	13420,93
178	13419,30	13452,23
179	13663,50	13641,54
180	13845,00	13729,56
181	14031,10	13870,77
182	13798,30	13946,55
183	13935,70	13988,30
184	13758,80	14078,69
185	13255,90	14004,32
186	13055,90	13943,83
187	13444,00	13763,78
188	13880,50	13729,19
189	14210,20	13768,24
190	15719,70	13817,05
191	15482,70	14286,13
192	15147,80	14559,44
193	14907,00	14742,55
194	15420,60	14755,58
195	15064,80	15150,55
196	15023,00	14986,21
197	15382,20	14896,17
198	15596,80	15013,87
199	15381,90	14961,00
200	15358,70	14790,17
201	15595,30	14847,75
202	15300,40	15056,72
203	14829,50	14934,94
204	14866,30	14770,03

Result

No	d _t	y _t
205	14564,80	14748,40
206	14673,40	14610,98
207	15379,70	14445,12
208	15754,30	14511,28
209	16341,20	14781,80
210	16268,30	15009,57
211	16408,30	15186,50
212	15536,80	15569,72
213	15708,10	15405,62
214	15528,60	15497,45
215	15224,10	15361,16
216	15771,40	15202,47
217	16056,60	15062,01
218	16080,70	15118,18
219	15687,10	15204,88
220	15760,50	15028,49
221	15780,20	15240,04
222	14617,50	15224,51
223	16007,60	14885,69
224	16242,00	15120,68
225	16389,60	15177,94
226	16271,90	15405,47
227	16504,80	15217,92
228	16913,30	15711,65
229	16861,00	15840,55
230	16614,70	15789,94
231	16551,60	16160,57
232	16955,20	16096,38
233	17410,00	16068,81
234	17208,50	16147,64
235	17230,80	16247,58
236	17742,40	16392,43
237	18206,10	16542,19
238	18387,60	16791,26
239	18242,00	17043,56
240	18239,90	17325,22
241	17643,70	17520,79
242	17996,80	17210,09
243	17973,90	17204,05
244	18292,90	17158,43
245	18625,00	17300,19
246	19147,70	17237,32
247	19696,60	17609,35
248	19013,80	18017,85

Result			
No	d _t	y _t	
249	19382,80	18081,28	
250	19404,90	18538,21	
251	19926,50	18598,93	
252	19558,80	19013,88	
253	19460,30	18796,26	
254	18818,60	18981,23	
255	18952,20	18546,58	
256	18301,20	18212,57	
257	17788,60	17789,82	
258	18832,80	17473,96	
259	18899,90	17429,36	
260	18518,10	17413,22	
261	18356,50	17359,31	
262	17899,50	17207,68	
263	17902,00	17351,79	
264	17282,30	17061,88	
265	17259,30	16652,56	
266	17033,80	16791,67	
267	16965,80	16361,37	
268	17641,00	16119,50	
269	17418,50	16143,69	
270	18000,30	16206,22	
271	18885,90	16533,74	
272	19000,50	16878,27	
273	19324,50	17511,20	
274	19010,10	17887,65	
275	19478,70	18176,97	
276	18606,00	18782,94	
277	18603,80	18286,86	
278	18284,00	18359,72	
279	18497,70	17965,26	
280	18707,10	17798,24	
281	18771,60	17478,89	
282	18889,20	17527,41	
283	18786,40	17671,03	
284	19356,60	17588,97	
285	19171,90	17947,40	
286	19015,50	18043,09	
287	19165,70	18241,11	
288	19495,40	18256,12	
289	19488,50	18458,59	
290	19798,80	18450,22	
291	19381,40	18611,94	
292	19364,40	18717,00	

Result			
No	d _t	y _t	
293	19526,50	18650,11	
294	19321,60	18506,34	
295	19294,50	18598,49	
296	19611,10	18498,88	
297	20023,80	18500,59	
298	20167,20	18767,90	
299	20185,80	18811,33	
300	20347,80	19077,46	
301	20472,60	19432,82	
302	20836,10	19572,66	
303	20887,00	19856,45	
304	20030,70	20148,74	
305	20190,80	19998,86	
306	20322,20	19794,52	
307	20485,00	19589,52	
308	20330,90	19649,36	
309	20272,90	19410,50	
310	20040,10	19555,62	
311	19419,80	19334,25	
312	19505,20	18795,87	
313	19259,50	18748,90	
314	19104,40	18561,71	
315	18678,20	18330,92	
316	18687,50	17846,61	
317	19269,50	17760,61	
318	19935,70	17751,20	
319	19528,10	18018,45	
320	19270,40	18260,82	
321	19431,50	18385,05	
322	18586,50	18485,05	
323	18217,10	18209,77	
324	18229,70	17867,57	
325	17737,90	17668,22	
326	18022,70	17377,02	
327	17678,30	16873,55	
328	18244,70	16630,65	
329	18272,40	16922,65	
330	17624,10	16733,89	
331	17002,00	16813,02	
332	16807,70	16575,06	
333	17102,50	16355,91	
334	17144,70	16292,64	
335	16645,90	16077,73	
336	16531,30	16006,75	

Result			
No	d _t	y _t	
337	15922,40	15878,88	
338	16124,30	15525,44	
339	16334,20	15409,96	
340	16628,80	15365,22	
341	17167,40	15608,37	
342	16791,10	15735,92	
343	17235,50	15788,23	
344	17164,00	16067,18	
345	17327,90	16096,34	
346	17081,10	16451,37	
347	16766,80	16361,97	
348	16867,50	16367,82	
349	17044,40	16261,77	
350	17708,20	16113,90	
351	18020,30	16355,45	
352	17604,10	16530,26	
353	17615,60	16675,14	
354	17786,40	16703,25	
355	17664,50	16797,88	
356	17079,80	16891,51	
357	17230,50	16653,49	
358	17099,00	16658,81	
359	16901,40	16447,33	
360	16964,10	16145,56	
361	16785,40	16021,52	
362	16752,80	16057,76	
363	16820,00	15940,01	
364	16888,60	15806,60	
365	17355,20	15955,16	
366	17710,40	16088,58	
367	17735,50	16283,97	
368	17967,60	16545,76	
369	18290,30	16743,18	
370	18416,40	17057,05	
371	18554,80	17328,39	
372	18237,60	17506,16	
373	18296,70	17606,62	
374	18076,90	17642,98	
375	18327,10	17390,39	
376	18368,40	17441,23	
377	18493,00	17366,67	
378	18635,20	17444,18	
379	18966,20	17452,85	
380	19157,30	17630,24	

Result			
No	d _t	y _t	
381	18945,00	17866,92	
382	18881,30	17965,88	
383	18779,80	18092,05	
384	18628,70	18059,03	
385	18904,30	17951,77	
386	18645,40	17908,08	
387	18774,60	17832,17	
388	19018,60	17818,39	
389	19111,40	17736,28	
390	19380,90	17930,51	
391	19698,10	18065,32	
392	19427,40	18359,68	
393	19048,50	18575,93	
394	19344,30	18416,42	
395	19187,60	18496,90	
396	19248,10	18482,16	
397	19392,60	18375,43	
398	18908,60	18333,84	
399	18775,50	18288,98	
400	18826,00	17962,91	
401	18832,20	17794,94	
402	19459,70	17916,07	
403	19268,10	17975,31	
404	19187,80	18061,47	
405	19286,30	18237,01	
406	19363,70	18127,25	
407	19663,60	18361,94	
408	19558,00	18521,46	
409	19572,30	18592,78	
410	19855,30	18820,31	
411	20218,40	18770,97	
412	20512,20	18997,72	
413	20525,90	19320,77	
414	20775,00	19580,97	
415	20851,60	19949,43	
416	21119,20	20070,05	
417	21468,30	20353,12	
418	21398,00	20707,86	
419	21004,10	20974,30	
420	21060,20	20858,78	
421	21705,30	20723,34	
422	21616,50	20959,05	
423	21704,80	20972,40	
424	20833,20	21119,96	

Result

No	d _t	y _t
425	20373,40	20827,15
426	21192,90	20440,86
427	21491,40	20134,74
428	22276,70	20384,11
429	22307,40	21011,51
430	22083,00	21185,78
431	22293,80	21673,47
432	22219,90	21616,07
433	21953,50	21940,08
434	21722,50	22345,62
435	21987,70	21977,91
436	21612,50	21909,91
437	22287,10	21342,09
438	22432,20	21309,02
439	22951,40	21508,57
440	22787,30	22119,95
441	22289,90	22098,29
442	22630,00	22359,60
443	22318,90	22559,31
444	22477,10	22318,64
445	22334,30	22518,66
446	22550,90	22145,38
447	22220,80	22314,83
448	22201,50	21810,56
449	22244,00	21666,91
450	21907,80	21779,58
451	22142,50	21607,40
452	22565,80	21559,50
453	22899,90	21702,13
454	22857,90	22125,59
455	23215,60	22183,82
456	23437,80	22705,00
457	23006,50	23176,75
458	23215,60	23173,64
459	22616,00	23420,92
460	22544,30	23259,43
461	22618,00	23000,37
462	22186,90	22370,24
463	22104,70	22204,42
464	22566,40	21793,50
465	23132,60	21582,62
466	23176,70	22067,00
467	22931,40	22189,18
468	23472,40	22524,02

Result

No	d _t	y _t
469	23516,30	23161,66
470	23464,50	23288,17
471	23293,20	23575,79
472	22799,20	23739,31
473	22486,20	23631,24
474	22560,90	22896,23
475	23150,10	22343,81
476	23008,10	22602,55
477	23049,50	22450,44
478	23075,60	22471,80
479	22625,40	22528,05
480	22679,90	22458,15
481	22943,70	22391,49
482	23634,80	22612,71
483	23417,90	23216,14
484	23289,70	23032,09
485	23935,20	23211,93
486	24360,60	23603,05
487	24341,40	24016,99
488	24044,60	24480,92
489	24525,30	24760,71
490	24430,80	25286,85
491	24537,70	24940,41
492	24590,80	24950,86
493	24935,80	25223,73
494	24971,70	25558,22
495	25445,20	25276,97
496	25042,00	25525,45
497	24422,90	25822,65
498	24561,90	25598,36
499	25308,30	25224,34
500	25604,70	25440,22
501	26110,20	25695,93
502	26271,30	26092,96
503	26493,00	26706,32
504	26362,70	27100,55
505	26863,20	27101,62
506	26813,10	28078,43
507	26918,10	28597,09
508	26469,40	28613,82
509	26860,00	28102,74
510	27056,00	28056,83
511	27302,70	27798,23
512	27074,10	27926,54

Result			
No	d_t	y_t	
513	27330,40	28023,54	
514	27849,80	28171,84	
515	27936,50	28328,76	
516	27554,80	28505,42	
517	27813,20	28863,12	
518	28201,70	29119,31	
519	28269,70	29169,19	
520	27528,10	29110,76	
521	27308,80	28930,81	
522	27736,30	28909,07	
523	28003,60	28439,06	
524	28164,10	28067,06	
525	27661,60	28425,80	
526	27000,40	28555,17	
527	27293,20	28096,69	
528	26864,30	27386,88	
529	26657,40	27143,58	
530	26921,30	27415,91	
531	27354,60	27064,75	
532	28031,50	27096,28	
533	28396,20	27218,36	
534	27768,50	27746,73	
535	27226,40	28751,37	
536	27558,90	28701,28	
537	27663,20	28587,47	
538	27789,90	28825,42	
539	27698,30	28883,85	
540	27746,40	28680,45	
541	27519,80	28515,07	
542	27572,80	27721,68	
543	26936,80	27661,25	
544	26547,20	27898,61	
545	25331,70	27638,70	
546	24476,00	26378,33	
547	25348,50	25217,09	
548	24636,70	24531,76	
549	25218,20	23790,58	
550	24439,30	23982,57	
551	25068,50	23315,12	
552	25502,60	24079,36	
553	24842,20	23951,64	
554	24479,70	24575,60	
555	24600,90	25236,16	
556	25557,80	24887,76	

Result			
No	d_t	y_t	
557	25740,80	25437,98	
558	25445,10	25341,71	
559	25682,50	25983,91	
560	26056,60	26448,38	
561	25831,20	26308,03	
562	25786,50	26410,67	
563	25370,30	26843,01	
564	25078,00	27005,01	
565	25293,20	26372,14	
566	24542,00	25526,21	
567	23853,30	25142,87	
568	23285,90	24624,31	
569	24143,90	23447,67	
570	24175,90	23317,09	
571	24419,40	22988,53	
572	24730,80	23378,82	
573	24798,10	23925,03	
574	24484,00	24337,32	
575	24070,10	24352,50	
576	23519,60	24534,58	
577	23591,60	24751,43	
578	24253,00	24204,53	
579	24137,90	23907,04	
580	24560,20	23889,19	
581	25099,90	24068,00	
582	24950,80	24374,47	
583	24702,20	24879,05	
584	24688,30	25032,88	
585	24662,90	25471,92	
586	25114,40	25813,11	
587	25325,70	25562,29	
588	24921,30	25665,17	
589	24846,10	25787,12	
590	25205,50	25364,89	
591	25464,90	25306,53	
592	24329,10	25660,36	
593	24140,90	25256,54	
594	24119,80	25113,19	
595	24054,10	24537,42	
596	24453,10	23972,54	
597	24977,80	23781,48	
598	25236,50	24416,36	
599	25230,80	24911,96	
600	25799,10	24722,46	

Result			
No	d _t	y _t	
601	26051,60	25666,69	
602	25533,10	26639,00	
603	25478,00	26843,92	
604	25779,80	26977,95	
605	25500,00	27079,20	
606	25725,20	26683,66	
607	25610,00	26325,52	
608	25929,90	26317,95	
609	26209,40	26480,79	
610	26579,70	26086,66	
611	26529,30	26716,69	
612	26709,20	27281,06	
613	26746,40	27482,20	
614	26779,30	27741,74	
615	27021,50	27920,04	
616	27033,40	28111,74	
617	26597,80	28240,93	
618	26811,40	28010,39	
619	27135,90	27696,32	
620	26957,30	27694,06	
621	27616,90	27706,22	
622	27702,30	27935,68	
623	27377,60	28264,85	
624	27781,40	28455,49	
625	27689,50	28321,49	
626	27842,40	28715,17	
627	27808,10	29152,92	
628	27689,20	28699,01	
629	28061,90	28999,25	
630	28500,90	28897,43	
631	28427,30	28711,47	
632	28402,70	29257,43	
633	28675,40	29361,62	
634	28713,50	29515,71	
635	28992,10	29675,84	
636	29188,10	29798,87	
637	29273,30	30185,65	
638	28730,70	30541,34	
639	29164,80	29995,92	
640	29343,00	29971,44	
641	29615,30	30084,00	
642	29776,70	30334,47	
643	29543,50	30378,39	
644	29727,10	30511,16	

Result			
No	d _t	y _t	
645	30123,60	30511,40	
646	29945,40	30323,60	
647	29924,80	30852,55	
648	29701,00	31034,58	
649	29683,20	30669,32	
650	29111,80	30523,91	
651	28175,90	29729,39	
652	28074,90	29162,59	
653	28257,70	28648,15	
654	27906,30	27783,33	
655	28000,00	27293,28	
656	28456,90	27112,28	
657	28951,40	27371,96	
658	29191,60	27843,68	
659	29372,20	28230,37	
660	29814,20	29465,45	
661	30020,40	30652,26	
662	30015,10	30945,40	
663	30908,00	31386,76	
664	31948,00	32228,97	
665	31701,60	32951,44	
666	31879,50	33205,86	
667	31832,50	33438,88	
668	31385,00	33530,61	
669	31485,40	33409,75	
670	32202,70	32807,70	
671	32711,10	33072,62	
672	32541,10	33478,44	
673	32632,40	32733,60	
674	33271,10	32686,27	
675	33294,30	33216,57	
676	33221,20	33320,79	
677	33719,30	33747,79	
678	33863,80	34375,55	
679	33465,60	34540,66	
680	33250,50	33991,47	
681	33516,00	33617,38	
682	33319,20	33895,36	
683	32745,00	33486,97	
684	33396,20	32752,45	
685	33333,20	32965,36	
686	34300,90	32800,91	
687	35624,80	33172,97	
688	34775,70	33872,91	

Result			
No	d_t	y_t	
689	33510,40	34876,35	
690	33413,60	34623,20	
691	33506,00	33792,78	
692	34040,20	34068,39	
693	33118,40	33963,92	
694	32054,30	33224,43	
695	31440,00	32919,14	
696	31850,70	30562,66	
697	31586,80	29360,43	
698	30766,70	29682,49	
699	31403,90	29827,85	
700	31428,60	29939,57	
701	31845,70	29269,46	
702	31670,00	29556,47	
703	31474,40	30123,58	
704	31273,30	31488,66	
705	31038,50	31362,25	
706	31964,00	30734,46	
707	32792,00	31740,22	
708	33152,10	32302,21	
709	33830,10	32963,61	
710	33749,40	33521,34	
711	33848,30	33924,13	
712	34709,70	34629,58	
713	34096,30	35091,43	
714	34171,50	35613,65	
715	34324,00	35857,03	
716	34866,60	34961,92	
717	35127,30	35287,10	
718	35314,30	34951,81	
719	35655,00	35111,84	
720	35254,10	35808,40	
721	36179,30	35404,49	
722	36907,80	35843,72	
723	36759,90	36491,29	
724	36621,50	37211,30	
725	37495,20	37106,96	
726	38088,70	37482,83	
727	38296,90	38062,12	
728	38573,70	38290,85	
729	39130,70	38779,81	
730	38917,80	39577,84	
731	38441,60	39372,00	
732	38587,80	39053,06	

Result			
No	d_t	y_t	
733	37496,20	39233,29	
734	38202,20	38744,13	
735	37741,70	38591,50	
736	37870,60	37635,71	
737	37631,60	38196,97	
738	37716,70	37163,91	
739	37960,10	37304,64	
740	37729,40	37369,25	
741	38210,20	37195,33	
742	38353,10	37812,73	
743	38919,50	38011,58	
744	39139,10	38553,88	
745	39015,90	38750,61	
746	39220,20	39147,17	
747	39837,30	39415,31	
748	39777,70	39720,88	
749	39790,70	39985,02	
750	40665,40	40169,48	
751	41362,50	40554,78	
752	41722,40	41153,60	
753	41905,40	41465,29	
754	43628,80	41732,62	
755	44076,90	42839,72	
756	42622,90	43249,52	
757	43645,20	43147,24	
758	44465,70	43459,10	
759	43851,40	43875,53	
760	44434,50	44007,43	
761	45746,20	43758,60	
762	45784,10	44512,22	
763	45315,20	44935,54	
764	44891,30	44411,65	
765	44590,20	44415,06	
766	45250,70	44709,79	
767	44841,00	44514,40	
768	44228,00	44274,85	
769	44855,60	44422,62	
770	44653,00	44316,66	
771	43842,70	44136,12	
772	44117,50	43851,30	
773	44772,90	43666,70	
774	44046,30	44107,55	
775	43507,50	43945,55	
776	43804,00	43443,11	

Result

No	d _t	y _t
777	45361,30	43587,25
778	46244,30	44236,70
779	46689,00	44328,21
780	46710,90	44819,50
781	46265,40	45197,95
782	46553,60	45246,61
783	46838,10	45177,85
784	47728,50	45278,18
785	47015,90	45739,44
786	47493,00	45660,02
787	46890,80	45810,63
788	46366,20	45513,46
789	45997,10	45498,05
790	43889,80	45105,81
791	42340,40	44659,80
792	42863,40	43943,92
793	42521,90	43233,47
794	44346,00	42853,35
795	42906,70	43221,12
796	43236,70	42280,43
797	44051,30	43175,49
798	44688,10	42586,31
799	44426,30	43460,30
800	44399,40	43615,26
801	44328,80	43956,20
802	44531,20	44234,89
803	43273,90	44169,73
804	42710,50	43460,11
805	41742,10	43538,61
806	42507,00	42820,32
807	42941,70	42812,48
808	42911,30	42370,75
809	44028,40	42674,70
810	44070,90	43029,44
811	44088,60	43172,03
812	43710,60	43472,34
813	44284,20	43252,42
814	43099,30	43899,72
815	42890,30	43600,13
816	42505,00	43422,34
817	41919,30	42940,73
818	42212,00	42871,78
819	41860,70	42277,44
820	42864,90	41936,60

Result

No	d _t	y _t
821	43732,50	42531,13
822	43872,80	42538,91
823	45075,90	43045,61
824	45278,40	43676,74
825	45352,50	44014,75
826	44745,50	44537,14
827	43752,00	44282,59
828	43880,40	44264,45
829	44030,40	44189,31
830	44413,60	43922,35
831	44647,80	44087,59
832	44251,40	44031,65
833	44212,80	43955,24
834	44712,90	43854,06
835	44563,30	43816,72
836	43599,00	43989,67
837	43713,20	43827,60
838	41970,80	43756,09
839	40268,70	43071,19
840	41044,10	42083,06
841	40439,20	41310,40
842	39643,70	41020,82
843	36351,10	40334,72
844	37235,50	37027,18
845	36100,70	37375,03
846	36730,20	34603,53
847	38593,50	34796,60
848	38908,60	35395,03
849	37860,80	37312,23
850	38132,20	36833,65
851	38395,20	36329,83
852	39285,80	37902,69
853	37964,00	39189,63
854	37464,40	38365,14
855	36709,60	39132,56
856	35338,70	37692,15
857	34802,60	35856,08
858	34330,30	34470,52
859	32384,40	33636,06
860	32899,70	32026,67
861	33627,40	30162,53
862	34048,00	29380,28
863	34807,70	30719,68
864	34601,40	31001,05

Result			Test Result		
No	d _t	y _t	No	d _t	y _t
865	33762,00	32283,05	1	51643,80	47182,04
866	34229,00	33277,12	2	51112,00	46947,88
867	33132,30	32986,17	3	53325,30	47424,48
868	31950,60	33423,60	4	52935,80	47338,02
869	32470,40	33700,44	5	55625,40	47593,70
870	33207,10	32343,73	6	54930,70	47624,65
871	34031,10	32156,72	7	54831,90	47904,46
872	35453,30	32249,81	8	52512,40	47403,48
873	35456,50	32637,46	9	51561,90	47385,38
874	36481,20	34331,55	10	51459,20	47226,22
875	35385,00	35759,03	11	52824,90	47372,82
876	35698,70	35291,45	12	51299,30	47188,96
877	36202,20	37081,30	13	51393,60	47208,43
878	36148,40	37200,31	14	50716,40	46872,32
879	35955,80	37475,11	15	50429,90	46891,02
880	35815,50	37084,62	16	50708,20	46593,53
881	35010,50	36295,61	17	52070,60	46992,39
882	33831,70	35692,09	18	49974,80	46900,44
883	32702,90	34036,20	19	49186,40	46682,07
884	33618,00	32559,68	20	50272,50	46549,18
885	33554,40	32738,99	21	49880,90	46734,24
886	35311,00	31741,22	22	47714,10	46155,50
887	34988,80	32685,30	23	44473,30	45293,29
888	34959,00	32616,13	24	46576,90	45734,12
889	35264,40	33825,52	25	46148,80	44983,07
890	35984,50	33660,28	26	45265,00	44632,53
891	36747,30	35056,01	27	46882,00	44760,20
892	36101,90	36724,78	28	47388,60	45470,55
893	36067,90	36951,31	29	46824,00	45172,01
894	35742,80	37379,41	30	47914,40	44856,12
895	35721,60	36525,58	31	47750,70	45666,16
896	35262,90	36008,76	32	48082,20	46120,71
897	36159,60	35520,01	33	50198,60	46065,92
898	35967,50	36042,64	34	49936,90	46513,42
899	36535,70	35763,74	35	50032,60	46751,18
900	37563,30	35840,48	36	49421,40	46404,12
901	37389,30	36074,62	37	49601,40	46712,32
902	37418,10	37014,17	38	49050,40	46456,34
903	37631,10	37426,47	39	48548,90	46332,96
904	37806,50	37520,97	40	49296,20	46497,25
905	38433,40	38336,82	41	49233,10	46496,68
906	37885,30	38553,09	42	49680,50	46483,72
907	37384,80	38302,37	43	50620,90	46543,57
908	37164,90	38527,99	44	50536,50	46744,06

Result			
No	d_t	y_t	
45	50500,90	46762,58	
46	53884,10	47147,45	
47	53543,10	47361,54	
48	53882,10	47561,09	
49	53580,70	47379,88	
50	52893,20	47624,86	
51	54245,80	47555,98	
52	54390,20	47524,92	
53	54044,20	47744,12	
54	54198,00	47665,44	
55	54733,30	47713,62	
56	54164,90	47669,91	
57	54915,90	47649,16	
58	56793,00	47875,37	
59	56279,10	47975,16	
60	57910,60	48034,60	
61	57418,00	48010,61	
62	58053,40	48203,61	
63	58231,90	48073,98	
64	57185,40	48115,38	
65	57931,90	48164,15	
66	56268,20	48020,65	
67	55486,80	48012,78	
68	53969,80	47717,92	
69	55752,20	47894,19	
70	55638,90	47812,94	
71	55728,60	47853,87	
72	56446,60	47850,55	
73	56774,30	47982,73	
74	57615,70	47997,76	
75	57371,30	47956,95	
76	56855,10	48065,81	
77	56064,30	47999,86	
78	56906,00	48013,24	
79	56076,40	47958,34	
80	55160,80	47907,16	
81	53689,10	47702,32	
82	54084,00	47737,63	
83	54719,00	47649,64	
84	55664,90	47738,32	
85	54743,00	47708,99	
86	54304,50	47728,19	
87	53262,90	47517,96	
88	53577,80	47520,64	

Result			
No	d_t	y_t	
89	52615,60	47346,07	
90	52199,30	47408,26	
91	52331,30	47333,61	
92	52682,50	47359,44	
93	51452,30	47107,84	
94	53202,80	47269,57	
95	53181,20	47314,67	
96	54213,80	47579,81	
97	54320,00	47426,28	
98	54013,30	47653,49	
99	55521,20	47746,49	
100	56186,90	47790,83	
101	56490,60	47945,88	
102	56518,60	47938,62	
103	56271,30	47994,29	
104	56766,20	48019,81	
105	55239,00	47847,47	
106	54911,70	47864,08	
107	53603,40	47693,60	
108	54223,60	47754,27	
109	53847,40	47560,21	
110	55510,50	47763,75	
111	55380,70	47730,55	
112	55373,20	47816,77	
113	55233,00	47703,14	
114	55698,40	47825,65	
115	55538,10	47812,87	
116	54708,40	47764,27	
117	53541,30	47682,58	
118	52529,90	47559,69	
119	52569,50	47421,12	
120	53235,90	47411,52	
121	52730,70	47386,28	
122	52351,00	47333,75	
123	51920,60	47191,96	
124	51480,90	47121,41	
125	50377,30	46847,19	
126	49093,80	46643,62	
127	48902,80	46574,79	
128	48657,50	46370,87	
129	45544,10	45569,12	
130	44593,70	44976,46	
131	42539,50	43762,73	
132	45010,70	44264,89	

Result			
No	d_t	y_t	
133	45497,20	43410,83	
134	43706,70	43715,42	
135	44572,70	43608,33	
136	44304,40	43352,73	
137	42697,60	43108,49	
138	44452,10	43020,98	
139	45719,90	44189,75	
140	44350,80	44597,57	
141	43317,50	43287,64	
142	41866,40	42920,49	
143	41957,90	43096,06	
144	41342,80	41480,94	
145	43539,90	42725,83	
146	44752,50	43429,82	

Result			
No	d_t	y_t	
147	45493,70	43978,37	
148	44305,30	43332,62	
149	45741,70	44326,91	
150	46249,30	44579,54	
151	45876,70	44964,81	
152	46446,60	45036,20	
153	45592,50	45267,25	
154	44895,00	45062,35	
155	45524,50	44538,83	
156	46260,30	44961,33	
157	45823,30	45057,18	
158	44776,90	44520,82	
159	43343,60	44095,12	
160	42923,00	43665,99	

APPENDIX_E

DAN2 RESULTS FOR TRAINING AND TEST

Training			Result		
Result					
No	d _t	y _t	No	d _t	y _t
1	10161,20	9781,82	37	10841,80	10922,18
2	10225,80	10226,45	38	10961,30	10885,24
3	10204,10	10276,01	39	10817,50	11008,99
4	10412,70	10242,14	40	10744,70	10866,60
5	10124,90	10466,81	41	10614,10	10788,97
6	10280,70	10163,29	42	10666,60	10652,02
7	10467,90	10326,85	43	10604,30	10716,53
8	10348,30	10521,01	44	9482,92	10656,74
9	10590,30	10389,82	45	10581,50	9526,46
10	10570,40	10640,92	46	9938,21	10689,79
11	10544,70	10620,84	47	9644,31	10016,22
12	10881,90	10589,47	48	9406,56	9688,65
13	10825,90	10936,35	49	8892,65	9470,79
14	10931,10	10870,37	50	9187,88	8935,69
15	10742,90	10974,08	51	9408,46	9237,13
16	10725,70	10788,71	52	9572,25	9463,63
17	10945,70	10770,85	53	9631,43	9623,90
18	11032,00	11000,37	54	9475,09	9675,73
19	11122,00	11081,53	55	9773,83	9518,02
20	10658,30	11167,26	56	9804,88	9827,53
21	10659,90	10681,72	57	10153,20	9854,13
22	10921,80	10690,61	58	10415,00	10206,00
23	11013,80	10971,81	59	10743,00	10471,33
24	11302,50	11061,86	60	10512,90	10807,43
25	11775,50	11351,75	61	10886,20	10547,29
26	11607,30	11839,96	62	10629,70	10934,35
27	11669,30	11646,46	63	10565,90	10669,02
28	11754,00	11706,43	64	11103,40	10599,89
29	11392,60	11809,85	65	11169,00	11161,51
30	11272,70	11422,82	66	11366,00	11219,44
31	11291,90	11300,43	67	11219,20	11412,79
32	11486,80	11330,32	68	11254,00	11263,49
33	11574,40	11543,14	69	11504,70	11302,74
34	10128,90	11623,72	70	11405,20	11560,01
35	10616,10	10177,28	71	11119,60	11449,83
36	10815,50	10724,91	72	11341,40	11147,91

Result			
No	d_t	y_t	
73	11311,10	11387,28	
74	11436,20	11360,05	
75	11510,00	11484,12	
76	11467,60	11564,25	
77	11300,70	11516,88	
78	11112,10	11343,07	
79	10962,90	11143,13	
80	10676,30	10993,57	
81	10783,90	10701,98	
82	10640,40	10823,83	
83	10712,90	10681,18	
84	10590,70	10766,88	
85	10393,30	10638,25	
86	10229,40	10427,96	
87	10306,30	10259,87	
88	10427,00	10349,75	
89	10540,90	10483,08	
90	10695,20	10590,90	
91	11056,30	10743,97	
92	11125,30	11110,26	
93	11088,90	11171,38	
94	11437,40	11126,90	
95	11407,10	11490,38	
96	11381,40	11451,97	
97	11579,30	11420,68	
98	11346,50	11636,10	
99	11084,70	11388,89	
100	11129,70	11109,86	
101	10973,40	11166,37	
102	10827,80	11011,60	
103	10644,70	10864,17	
104	10597,30	10675,42	
105	10489,20	10634,32	
106	10713,90	10528,83	
107	11036,70	10769,76	
108	11169,20	11091,07	
109	11107,50	11217,58	
110	10902,50	11145,53	
111	10783,90	10940,00	
112	10747,50	10817,21	
113	10756,80	10786,93	
114	10740,20	10809,29	
115	10927,80	10801,26	
116	10981,20	10984,10	

Result			
No	d_t	y_t	
117	10884,40	11031,99	
118	10749,80	10928,89	
119	10690,90	10791,56	
120	10726,60	10731,68	
121	10502,90	10777,89	
122	10351,80	10542,18	
123	10546,90	10383,64	
124	10364,90	10595,13	
125	10399,70	10410,36	
126	10454,90	10447,17	
127	10658,80	10509,33	
128	10918,60	10711,79	
129	10791,40	10969,85	
130	10751,50	10829,75	
131	10856,90	10794,46	
132	10827,30	10912,62	
133	10544,50	10884,51	
134	10463,80	10576,95	
135	10475,20	10496,19	
136	10561,30	10516,72	
137	10598,30	10621,04	
138	10478,30	10654,28	
139	10445,00	10528,10	
140	10572,00	10494,18	
141	10621,20	10628,69	
142	11112,10	10676,00	
143	11499,90	11169,60	
144	11311,10	11572,51	
145	11547,40	11351,16	
146	11558,50	11591,28	
147	11762,30	11609,75	
148	11860,10	11809,43	
149	11916,10	11909,37	
150	11794,90	11961,22	
151	11877,50	11843,35	
152	11661,20	11933,56	
153	11688,90	11701,57	
154	11557,00	11734,49	
155	11845,90	11597,74	
156	12001,10	11900,36	
157	11798,00	12051,54	
158	11735,20	11832,10	
159	11623,40	11775,71	
160	11509,00	11661,11	

Result			
No	d_t	y_t	
161	11611,80	11548,30	
162	11652,80	11663,38	
163	11637,10	11709,72	
164	11671,80	11689,87	
165	11636,50	11732,15	
166	11631,80	11696,81	
167	11581,30	11691,64	
168	11946,70	11636,90	
169	12317,70	12000,92	
170	12507,00	12375,37	
171	12715,20	12560,05	
172	12662,50	12761,17	
173	13005,00	12703,57	
174	12958,20	13054,62	
175	13419,30	13002,93	
176	13663,50	13469,92	
177	13845,00	13715,26	
178	14031,10	13889,88	
179	13798,30	14075,65	
180	13935,70	13834,23	
181	13758,80	13983,65	
182	13255,90	13799,99	
183	13055,90	13268,84	
184	13444,00	13078,29	
185	13880,50	13492,13	
186	14210,20	13938,73	
187	15719,70	14270,76	
188	15482,70	15910,13	
189	15147,80	15597,44	
190	14907,00	15178,07	
191	15420,60	14926,25	
192	15064,80	15471,68	
193	15023,00	15097,74	
194	15382,20	15050,89	
195	15596,80	15433,74	
196	15381,90	15644,89	
197	15358,70	15411,88	
198	15595,30	15399,21	
199	15300,40	15648,09	
200	14829,50	15337,11	
201	14866,30	14839,61	
202	14564,80	14894,11	
203	14673,40	14589,52	
204	15379,70	14715,61	

Result			
No	d_t	y_t	
205	15754,30	15441,80	
206	16341,20	15820,99	
207	16268,30	16419,89	
208	16408,30	16306,33	
209	15536,80	16443,16	
210	15708,10	15538,60	
211	15528,60	15732,36	
212	15224,10	15560,01	
213	15771,40	15247,33	
214	16056,60	15822,90	
215	16080,70	16109,08	
216	15687,10	16116,24	
217	15760,50	15709,81	
218	15780,20	15794,71	
219	14617,50	15823,26	
220	16007,60	14614,48	
221	16242,00	16085,96	
222	16389,60	16332,24	
223	16271,90	16461,96	
224	16504,80	16309,74	
225	16913,30	16555,26	
226	16861,00	16965,88	
227	16614,70	16897,05	
228	16551,60	16641,13	
229	16955,20	16584,60	
230	17410,00	17008,00	
231	17208,50	17464,05	
232	17230,80	17237,40	
233	17742,40	17265,05	
234	18206,10	17796,82	
235	18387,60	18261,45	
236	18242,00	18430,41	
237	18239,90	18270,24	
238	17643,70	18283,67	
239	17996,80	17652,64	
240	17973,90	18032,88	
241	18292,90	18014,91	
242	18625,00	18336,27	
243	19147,70	18673,72	
244	19696,60	19200,26	
245	19013,80	19755,57	
246	19382,80	19023,12	
247	19404,90	19414,69	
248	19926,50	19445,61	

Result			
No	d_t	y_t	
249	19558,80	19973,27	
250	19460,30	19586,28	
251	18818,60	19482,93	
252	18952,20	18821,99	
253	18301,20	18976,20	
254	17788,60	18309,65	
255	18832,80	17788,72	
256	18899,90	18895,62	
257	18518,10	18950,13	
258	18356,50	18530,55	
259	17899,50	18377,44	
260	17902,00	17910,16	
261	17282,30	17926,44	
262	17259,30	17290,42	
263	17033,80	17278,92	
264	16965,80	17057,55	
265	17641,00	17000,17	
266	17418,50	17697,74	
267	18000,30	17452,56	
268	18885,90	18045,87	
269	19000,50	18964,82	
270	19324,50	19059,52	
271	19010,10	19365,29	
272	19478,70	19040,28	
273	18606,00	19523,95	
274	18603,80	18610,60	
275	18284,00	18616,59	
276	18497,70	18304,09	
277	18707,10	18540,84	
278	18771,60	18757,30	
279	18889,20	18811,80	
280	18786,40	18932,93	
281	19356,60	18831,10	
282	19171,90	19407,83	
283	19015,50	19207,16	
284	19165,70	19038,58	
285	19495,40	19210,22	
286	19488,50	19546,64	
287	19798,80	19526,67	
288	19381,40	19841,68	
289	19364,40	19408,30	
290	19526,50	19392,12	
291	19321,60	19569,73	
292	19294,50	19361,67	

Result			
No	d_t	y_t	
293	19611,10	19333,41	
294	20023,80	19662,50	
295	20167,20	20073,43	
296	20185,80	20205,54	
297	20347,80	20219,21	
298	20472,60	20394,23	
299	20836,10	20519,32	
300	20887,00	20882,15	
301	20030,70	20925,74	
302	20190,80	20025,49	
303	20322,20	20209,49	
304	20485,00	20360,33	
305	20330,90	20528,64	
306	20272,90	20368,82	
307	20040,10	20311,76	
308	19419,80	20067,77	
309	19505,20	19420,49	
310	19259,50	19526,82	
311	19104,40	19283,22	
312	18678,20	19132,25	
313	18687,50	18690,16	
314	19269,50	18712,98	
315	19935,70	19323,84	
316	19528,10	19999,85	
317	19270,40	19549,42	
318	19431,50	19282,26	
319	18586,50	19466,28	
320	18217,10	18586,48	
321	18229,70	18219,70	
322	17737,90	18257,99	
323	18022,70	17751,20	
324	17678,30	18060,50	
325	18244,70	17705,35	
326	18272,40	18292,57	
327	17624,10	18316,22	
328	17002,00	17628,65	
329	16807,70	17002,95	
330	17102,50	16832,55	
331	17144,70	17143,45	
332	16645,90	17192,73	
333	16531,30	16662,08	
334	15922,40	16551,04	
335	16124,30	15932,83	
336	16334,20	16154,39	

Result			
No	d _t	y _t	
337	16628,80	16381,50	
338	17167,40	16675,02	
339	16791,10	17222,85	
340	17235,50	16815,84	
341	17164,00	17276,74	
342	17327,90	17206,89	
343	17081,10	17366,43	
344	16766,80	17119,94	
345	16867,50	16785,85	
346	17044,40	16901,65	
347	17708,20	17094,98	
348	18020,30	17765,62	
349	17604,10	18074,27	
350	17615,60	17620,99	
351	17786,40	17645,80	
352	17664,50	17831,77	
353	17079,80	17709,61	
354	17230,50	17087,12	
355	17099,00	17258,18	
356	16901,40	17131,78	
357	16964,10	16933,88	
358	16785,40	17005,22	
359	16752,80	16823,35	
360	16820,00	16794,56	
361	16888,60	16869,20	
362	17355,20	16942,74	
363	17710,40	17406,70	
364	17735,50	17760,90	
365	17967,60	17770,37	
366	18290,30	18009,28	
367	18416,40	18338,82	
368	18554,80	18456,58	
369	18237,60	18594,48	
370	18296,70	18268,68	
371	18076,90	18334,63	
372	18327,10	18107,65	
373	18368,40	18376,55	
374	18493,00	18416,77	
375	18635,20	18535,92	
376	18966,20	18683,57	
377	19157,30	19013,44	
378	18945,00	19200,10	
379	18881,30	18974,35	
380	18779,80	18917,58	

Result			
No	d _t	y _t	
381	18628,70	18815,11	
382	18904,30	18662,87	
383	18645,40	18954,70	
384	18774,60	18682,61	
385	19018,60	18816,33	
386	19111,40	19069,83	
387	19380,90	19153,68	
388	19698,10	19424,79	
389	19427,40	19744,40	
390	19048,50	19455,09	
391	19344,30	19061,40	
392	19187,60	19382,53	
393	19248,10	19226,25	
394	19392,60	19288,90	
395	18908,60	19444,27	
396	18775,50	18928,80	
397	18826,00	18793,97	
398	18832,20	18859,25	
399	19459,70	18882,65	
400	19268,10	19513,00	
401	19187,80	19301,11	
402	19286,30	19212,22	
403	19363,70	19332,18	
404	19663,60	19415,19	
405	19558,00	19711,40	
406	19572,30	19596,48	
407	19855,30	19611,75	
408	20218,40	19907,04	
409	20512,20	20266,38	
410	20525,90	20554,98	
411	20775,00	20559,36	
412	20851,60	20817,18	
413	21119,20	20895,55	
414	21468,30	21162,08	
415	21398,00	21514,36	
416	21004,10	21430,40	
417	21060,20	21020,86	
418	21705,30	21089,28	
419	21616,50	21760,02	
420	21704,80	21650,31	
421	20833,20	21733,41	
422	20373,40	20828,29	
423	21192,90	20369,64	
424	21491,40	21244,97	

Result			
No	d _t	y _t	
425	22276,70	21542,49	
426	22307,40	22340,74	
427	22083,00	22344,44	
428	22293,80	22098,66	
429	22219,90	22339,19	
430	21953,50	22262,71	
431	21722,50	21979,53	
432	21987,70	21740,98	
433	21612,50	22029,16	
434	22287,10	21639,46	
435	22432,20	22334,44	
436	22951,40	22476,22	
437	22787,30	22994,39	
438	22289,90	22817,27	
439	22630,00	22295,51	
440	22318,90	22664,90	
441	22477,10	22346,15	
442	22334,30	22513,99	
443	22550,90	22370,56	
444	22220,80	22596,62	
445	22201,50	22250,33	
446	22244,00	22231,80	
447	21907,80	22283,07	
448	22142,50	21933,34	
449	22565,80	22183,63	
450	22899,90	22616,63	
451	22857,90	22942,64	
452	23215,60	22886,88	
453	23437,80	23257,20	
454	23006,50	23481,41	
455	23215,60	23023,46	
456	22616,00	23251,01	
457	22544,30	22625,03	
458	22618,00	22559,24	
459	22186,90	22649,80	
460	22104,70	22206,17	
461	22566,40	22125,69	
462	23132,60	22614,52	
463	23176,70	23185,14	
464	22931,40	23208,98	
465	23472,40	22950,53	
466	23516,30	23520,75	
467	23464,50	23556,82	
468	23293,20	23490,66	

Result			
No	d _t	y _t	
469	22799,20	23326,61	
470	22486,20	22805,55	
471	22560,90	22491,27	
472	23150,10	22586,64	
473	23008,10	23202,91	
474	23049,50	23039,30	
475	23075,60	23077,12	
476	22625,40	23122,03	
477	22679,90	22642,16	
478	22943,70	22706,45	
479	23634,80	22989,00	
480	23417,90	23687,98	
481	23289,70	23443,74	
482	23935,20	23307,86	
483	24360,60	23986,78	
484	24341,40	24409,42	
485	24044,60	24367,23	
486	24525,30	24063,98	
487	24430,80	24571,39	
488	24537,70	24468,27	
489	24590,80	24569,46	
490	24935,80	24637,01	
491	24971,70	24980,60	
492	25445,20	25009,26	
493	25042,00	25487,10	
494	24422,90	25064,63	
495	24561,90	24414,77	
496	25308,30	24580,57	
497	25604,70	25363,45	
498	26110,20	25647,44	
499	26271,30	26151,05	
500	26493,00	26305,63	
501	26362,70	26525,19	
502	26863,20	26394,50	
503	26813,10	26906,82	
504	26918,10	26848,21	
505	26469,40	26947,43	
506	26860,00	26485,42	
507	27056,00	26897,90	
508	27302,70	27099,07	
509	27074,10	27337,08	
510	27330,40	27100,62	
511	27849,80	27369,35	
512	27936,50	27898,02	

Result			
No	d_t	y_t	
513	27554,80	27967,91	
514	27813,20	27566,31	
515	28201,70	27848,69	
516	28269,70	28247,91	
517	27528,10	28300,75	
518	27308,80	27523,24	
519	27736,30	27307,73	
520	28003,60	27772,20	
521	28164,10	28046,29	
522	27661,60	28194,80	
523	27000,40	27672,73	
524	27293,20	26985,79	
525	26864,30	27314,21	
526	26657,40	26878,61	
527	26921,30	26669,20	
528	27354,60	26956,67	
529	28031,50	27401,52	
530	28396,20	28080,26	
531	27768,50	28435,92	
532	27226,40	27768,53	
533	27558,90	27213,84	
534	27663,20	27583,69	
535	27789,90	27702,59	
536	27698,30	27823,10	
537	27746,40	27733,36	
538	27519,80	27785,98	
539	27572,80	27547,72	
540	26936,80	27607,20	
541	26547,20	26938,02	
542	25331,70	26541,91	
543	24476,00	25307,69	
544	25348,50	24464,77	
545	24636,70	25396,04	
546	25218,20	24649,00	
547	24439,30	25248,14	
548	25068,50	24444,42	
549	25502,60	25102,19	
550	24842,20	25553,34	
551	24479,70	24844,56	
552	24600,90	24476,97	
553	25557,80	24624,08	
554	25740,80	25617,99	
555	25445,10	25782,70	
556	25682,50	25454,39	

Result			
No	d_t	y_t	
557	26056,60	25722,27	
558	25831,20	26104,14	
559	25786,50	25856,51	
560	25370,30	25814,31	
561	25078,00	25382,16	
562	25293,20	25085,14	
563	24542,00	25325,03	
564	23853,30	24542,72	
565	23285,90	23836,29	
566	24143,90	23284,93	
567	24175,90	24191,12	
568	24419,40	24216,48	
569	24730,80	24448,08	
570	24798,10	24774,93	
571	24484,00	24832,58	
572	24070,10	24505,93	
573	23519,60	24075,78	
574	23591,60	23515,29	
575	24253,00	23610,08	
576	24137,90	24306,13	
577	24560,20	24168,81	
578	25099,90	24595,63	
579	24950,80	25149,88	
580	24702,20	24975,03	
581	24688,30	24718,80	
582	24662,90	24716,86	
583	25114,40	24699,48	
584	25325,70	25162,37	
585	24921,30	25366,72	
586	24846,10	24935,96	
587	25205,50	24867,66	
588	25464,90	25249,74	
589	24329,10	25508,23	
590	24140,90	24311,12	
591	24119,80	24136,16	
592	24054,10	24141,39	
593	24453,10	24090,55	
594	24977,80	24501,28	
595	25236,50	25026,97	
596	25230,80	25274,04	
597	25799,10	25257,21	
598	26051,60	25844,08	
599	25533,10	26092,45	
600	25478,00	25540,31	

Result			
No	d_t	y_t	
601	25779,80	25495,20	
602	25500,00	25820,32	
603	25725,20	25530,31	
604	25610,00	25762,84	
605	25929,90	25646,99	
606	26209,40	25971,95	
607	26579,70	26253,42	
608	26529,30	26618,84	
609	26709,20	26558,27	
610	26746,40	26744,22	
611	26779,30	26788,09	
612	27021,50	26817,15	
613	27033,40	27065,41	
614	26597,80	27071,21	
615	26811,40	26611,33	
616	27135,90	26842,96	
617	26957,30	27181,46	
618	27616,90	26984,32	
619	27702,30	27660,83	
620	27377,60	27739,25	
621	27781,40	27388,46	
622	27689,50	27822,69	
623	27842,40	27725,09	
624	27808,10	27875,03	
625	27689,20	27848,43	
626	28061,90	27721,58	
627	28500,90	28106,66	
628	28427,30	28545,87	
629	28402,70	28451,94	
630	28675,40	28428,97	
631	28713,50	28719,53	
632	28992,10	28750,92	
633	29188,10	29029,19	
634	29273,30	29226,50	
635	28730,70	29305,02	
636	29164,80	28738,09	
637	29343,00	29198,74	
638	29615,30	29383,46	
639	29776,70	29647,70	
640	29543,50	29811,23	
641	29727,10	29566,13	
642	30123,60	29763,79	
643	29945,40	30168,15	
644	29924,80	29969,96	

Result			
No	d_t	y_t	
645	29701,00	29950,22	
646	29683,20	29722,76	
647	29111,80	29710,87	
648	28175,90	29112,79	
649	28074,90	28147,57	
650	28257,70	28074,65	
651	27906,30	28284,72	
652	28000,00	27929,23	
653	28456,90	28030,23	
654	28951,40	28503,66	
655	29191,60	28995,11	
656	29372,20	29223,88	
657	29814,20	29401,26	
658	30020,40	29853,77	
659	30015,10	30054,65	
660	30908,00	30039,82	
661	31948,00	30957,00	
662	31701,60	32015,62	
663	31879,50	31719,26	
664	31832,50	31894,30	
665	31385,00	31866,40	
666	31485,40	31392,52	
667	32202,70	31506,58	
668	32711,10	32251,46	
669	32541,10	32753,45	
670	32632,40	32553,97	
671	33271,10	32655,99	
672	33294,30	33316,54	
673	33221,20	33321,74	
674	33719,30	33236,58	
675	33863,80	33760,09	
676	33465,60	33896,89	
677	33250,50	33472,32	
678	33516,00	33257,24	
679	33319,20	33546,18	
680	32745,00	33346,01	
681	33396,20	32739,10	
682	33333,20	33430,82	
683	34300,90	33363,52	
684	35624,80	34344,36	
685	34775,70	35700,92	
686	33510,40	34770,88	
687	33413,60	33454,15	
688	33506,00	33404,31	

Result			
No	d _t	y _t	
689	34040,20	33522,78	
690	33118,40	34082,63	
691	32054,30	33109,34	
692	31440,00	32008,82	
693	31850,70	31420,80	
694	31586,80	31871,68	
695	30766,70	31608,65	
696	31403,90	30747,09	
697	31428,60	31431,95	
698	31845,70	31462,11	
699	31670,00	31876,19	
700	31474,40	31696,17	
701	31273,30	31490,09	
702	31038,50	31287,79	
703	31964,00	31050,78	
704	32792,00	32013,78	
705	33152,10	32850,07	
706	33830,10	33187,95	
707	33749,40	33868,48	
708	33848,30	33769,57	
709	34709,70	33867,21	
710	34096,30	34757,87	
711	34171,50	34101,74	
712	34324,00	34178,84	
713	34866,60	34353,73	
714	35127,30	34906,48	
715	35314,30	35158,92	
716	35655,00	35337,73	
717	35254,10	35687,14	
718	36179,30	35265,90	
719	36907,80	36220,00	
720	36759,90	36958,17	
721	36621,50	36769,40	
722	37495,20	36628,41	
723	38088,70	37539,97	
724	38296,90	38131,45	
725	38573,70	38316,21	
726	39130,70	38595,80	
727	38917,80	39165,43	
728	38441,60	38930,66	
729	38587,80	38433,55	
730	37496,20	38601,50	
731	38202,20	37466,42	
732	37741,70	38220,55	

Result			
No	d _t	y _t	
733	37870,60	37749,54	
734	37631,60	37882,28	
735	37716,70	37644,95	
736	37960,10	37741,51	
737	37729,40	37994,56	
738	38210,20	37748,05	
739	38353,10	38242,69	
740	38919,50	38383,92	
741	39139,10	38950,61	
742	39015,90	39166,19	
743	39220,20	39026,40	
744	39837,30	39247,72	
745	39777,70	39876,36	
746	39790,70	39795,46	
747	40665,40	39803,04	
748	41362,50	40707,92	
749	41722,40	41404,32	
750	41905,40	41744,58	
751	43628,80	41920,61	
752	44076,90	43693,23	
753	42622,90	44118,82	
754	43645,20	42567,87	
755	44465,70	43660,38	
756	43851,40	44515,83	
757	44434,50	43836,88	
758	45746,20	44450,00	
759	45784,10	45803,66	
760	45315,20	45799,76	
761	44891,30	45293,52	
762	44590,20	44873,06	
763	45250,70	44576,46	
764	44841,00	45280,00	
765	44228,00	44847,78	
766	44855,60	44201,85	
767	44653,00	44876,18	
768	43842,70	44667,53	
769	44117,50	43812,29	
770	44772,90	44120,23	
771	44046,30	44809,75	
772	43507,50	44035,40	
773	43804,00	43477,24	
774	45361,30	43812,04	
775	46244,30	45423,33	
776	46689,00	46297,44	

Result

No	d _t	y _t
777	46710,90	46709,41
778	46265,40	46714,34
779	46553,60	46257,11
780	46838,10	46568,58
781	47728,50	46864,46
782	47015,90	47763,09
783	47493,00	47003,58
784	46890,80	47499,73
785	46366,20	46882,41
786	45997,10	46337,85
787	43889,80	45975,24
788	42340,40	43803,33
789	42863,40	42263,15
790	42521,90	42870,98
791	44346,00	42523,76
792	42906,70	44404,60
793	43236,70	42882,14
794	44051,30	43219,01
795	44688,10	44092,16
796	44426,30	44721,73
797	44399,40	44424,53
798	44328,80	44403,50
799	44531,20	44342,33
800	43273,90	44556,68
801	42710,50	43232,66
802	41742,10	42666,94
803	42507,00	41700,12
804	42941,70	42524,37
805	42911,30	42978,17
806	44028,40	42918,23
807	44070,90	44069,17
808	44088,60	44091,19
809	43710,60	44088,32
810	44284,20	43712,00
811	43099,30	44312,14
812	42890,30	43069,38
813	42505,00	42863,34
814	41919,30	42491,03
815	42212,00	41897,14
816	41860,70	42223,04
817	42864,90	41866,73
818	43732,50	42902,39
819	43872,80	43780,96
820	45075,90	43886,13

Result

No	d _t	y _t
821	45278,40	45116,88
822	45352,50	45301,97
823	44745,50	45353,09
824	43752,00	44733,78
825	43880,40	43703,62
826	44030,40	43870,01
827	44413,60	44047,00
828	44647,80	44440,58
829	44251,40	44670,32
830	44212,80	44250,57
831	44712,90	44218,32
832	44563,30	44743,64
833	43599,00	44577,88
834	43713,20	43563,05
835	41970,80	43704,89
836	40268,70	41908,81
837	41044,10	40186,42
838	40439,20	41058,21
839	39643,70	40436,66
840	36351,10	39607,54
841	37235,50	36261,99
842	36100,70	37256,60
843	36730,20	36107,13
844	38593,50	36743,57
845	38908,60	38682,70
846	37860,80	38959,88
847	38132,20	37824,62
848	38395,20	38134,83
849	39285,80	38423,71
850	37964,00	39328,47
851	37464,40	37935,14
852	36709,60	37426,44
853	35338,70	36683,89
854	34802,60	35285,85
855	34330,30	34775,29
856	32384,40	34318,12
857	32899,70	32324,73
858	33627,40	32904,63
859	34048,00	33679,50
860	34807,70	34083,44
861	34601,40	34849,27
862	33762,00	34616,23
863	34229,00	33738,27
864	33132,30	34247,78

Result			
No	d_t	y_t	
865	31950,60	33112,48	
866	32470,40	31899,66	
867	33207,10	32487,19	
868	34031,10	33259,07	
869	35453,30	34082,56	
870	35456,50	35535,13	
871	36481,20	35487,89	
872	35385,00	36522,72	
873	35698,70	35371,45	
874	36202,20	35701,02	
875	36148,40	36241,26	
876	35955,80	36168,09	
877	35815,50	35967,27	
878	35010,50	35831,04	
879	33831,70	34990,74	
880	32702,90	33784,33	
881	33618,00	32666,07	
882	33554,40	33648,65	
883	35311,00	33584,11	
884	34988,80	35384,74	
885	34959,00	35013,75	
886	35264,40	34955,02	
887	35984,50	35300,64	
888	36747,30	36028,69	
889	36101,90	36792,91	
890	36067,90	36096,37	
891	35742,80	36069,68	
892	35721,60	35746,03	
893	35262,90	35738,25	
894	36159,60	35263,83	
895	35967,50	36201,47	
896	36535,70	35991,06	
897	37563,30	36561,11	
898	37389,30	37617,86	
899	37418,10	37403,18	
900	37631,10	37424,00	
901	37806,50	37665,30	
902	38433,40	37837,42	
903	37885,30	38470,17	
904	37384,80	37888,73	
905	37164,90	37367,12	
906	37130,80	37159,07	
907	37121,80	37142,79	
908	36651,40	37146,82	

Result			
No	d_t	y_t	
909	36861,70	36653,43	
910	36686,70	36882,34	
911	36897,20	36706,19	
912	37285,90	36927,14	
913	37414,90	37323,44	
914	38139,10	37440,66	
915	38180,00	38176,19	
916	37689,70	38203,05	
917	37457,00	37683,40	
918	37372,00	37454,90	
919	37172,60	37381,08	
920	37624,50	37185,16	
921	37774,60	37660,12	
922	37478,70	37806,04	
923	38143,90	37486,98	
924	38245,90	38180,41	
925	38345,10	38275,49	
926	38275,00	38360,83	
927	37790,80	38299,71	
928	36390,00	37789,45	
929	36084,20	36335,28	
930	36432,40	36058,92	
931	36818,70	36451,72	
932	37268,20	36857,19	
933	36924,90	37300,24	
934	36983,90	36933,44	
935	36830,40	37001,03	
936	36389,70	36848,94	
937	36917,40	36389,39	
938	36737,60	36949,27	
939	36885,90	36761,15	
940	37449,20	36906,60	
941	37660,40	37489,75	
942	38316,90	37688,52	
943	38486,10	38350,37	
944	38998,00	38511,50	
945	38456,80	39025,25	
946	39743,80	38459,95	
947	39823,90	39787,52	
948	39643,80	39854,10	
949	40591,10	39638,89	
950	40683,30	40632,82	
951	40081,40	40709,08	
952	40582,30	40065,19	

Result			
No	d _t	y _t	
953	40601,70	40606,02	
954	39504,10	40627,29	
955	39307,10	39469,06	
956	39675,90	39286,21	
957	40163,70	39696,50	
958	39736,70	40200,46	
959	39890,90	39739,93	
960	39627,20	39906,05	
961	39030,30	39638,57	
962	39655,10	39015,42	
963	39654,10	39682,10	
964	39268,10	39680,49	
965	38432,80	39266,19	
966	38346,60	38402,36	
967	38501,10	38337,26	
968	37733,60	38519,59	
969	38077,10	37721,89	
970	37582,10	38091,89	
971	38238,60	37584,18	
972	37183,80	38270,16	
973	38066,90	37167,08	
974	38168,50	38091,12	
975	38196,50	38199,72	
976	37654,70	38206,13	
977	38163,00	37652,95	
978	38184,80	38191,01	
979	39857,80	38213,17	
980	39320,50	39922,00	
981	39461,90	39330,06	
982	39213,00	39456,90	
983	38874,90	39223,44	
984	39595,40	38875,07	
985	40204,80	39632,03	
986	39832,50	40246,39	
987	39071,10	39832,31	
988	38996,70	39043,64	
989	39083,00	38989,33	
990	39180,20	39099,39	
991	38705,40	39211,02	
992	38766,60	38708,35	
993	38610,60	38779,18	
994	39138,20	38624,91	
995	39117,50	39173,42	
996	39006,30	39142,50	

Result			
No	d _t	y _t	
997	38435,20	39017,55	
998	37832,10	38426,52	
999	37083,10	37808,02	
1000	36629,90	37052,17	
1001	37640,40	36608,57	
1002	38138,20	37682,42	
1003	39043,00	38180,93	
1004	38888,50	39085,49	
1005	39218,10	38901,01	
1006	40256,30	39234,21	
1007	40201,10	40306,10	
1008	41247,00	40218,23	
1009	41250,10	41283,10	
1010	42035,50	41271,74	
1011	42122,70	42062,61	
1012	41846,40	42145,00	
1013	41397,40	41844,04	
1014	41357,50	41387,77	
1015	41182,60	41360,17	
1016	42302,00	41190,66	
1017	43112,50	42347,10	
1018	42700,50	43160,20	
1019	42501,40	42693,61	
1020	42099,00	42494,76	
1021	41645,20	42090,03	
1022	42185,50	41629,37	
1023	42025,90	42210,15	
1024	42551,60	42044,90	
1025	43256,30	42576,25	
1026	43813,70	43295,46	
1027	43636,20	43843,04	
1028	44252,90	43639,06	
1029	44061,50	44277,79	
1030	42888,60	44076,25	
1031	43829,10	42841,70	
1032	43591,70	43847,91	
1033	43736,80	43606,03	
1034	41774,00	43741,73	
1035	41431,00	41702,06	
1036	39588,20	41386,20	
1037	40550,30	39534,80	
1038	39729,40	40558,84	
1039	40230,80	39722,20	
1040	40406,50	40242,37	

Result			
No	d _t	y _t	
1041	41406,90	40435,74	
1042	42056,30	41448,03	
1043	41978,30	42096,22	
1044	41666,00	41983,34	
1045	40501,90	41663,56	
1046	41195,20	40455,87	
1047	41819,80	41206,96	
1048	41922,20	41862,25	
1049	41817,70	41936,33	
1050	42419,40	41824,71	
1051	43239,80	42452,57	
1052	43408,70	43282,17	
1053	43263,60	43425,96	
1054	43097,10	43264,33	
1055	43079,50	43106,36	
1056	43666,20	43093,85	
1057	43661,10	43700,40	
1058	43542,20	43680,04	
1059	44309,30	43547,39	
1060	44660,70	44344,77	
1061	45714,10	44689,34	
1062	45845,20	45752,51	
1063	45889,20	45862,87	
1064	45339,80	45889,69	
1065	46105,80	45330,22	
1066	45566,10	46133,13	
1067	46044,20	45567,34	
1068	46697,10	46056,90	
1069	46621,50	46733,73	
1070	45634,00	46628,35	
1071	46308,10	45595,71	
1072	47355,80	46320,08	
1073	47014,90	47405,63	
1074	48032,70	47012,35	
1075	47826,10	48057,56	
1076	46861,30	47837,36	
1077	44984,50	46817,41	
1078	43529,50	44895,13	
1079	44256,10	43459,44	
1080	45077,70	44265,39	
1081	44818,10	45123,49	
1082	44681,10	44818,29	
1083	44707,30	44677,20	
1084	45102,70	44721,26	

Result			
No	d _t	y _t	
1085	45055,60	45131,97	
1086	44820,80	45072,40	
1087	45142,20	44823,76	
1088	44897,70	45166,17	
1089	45539,70	44910,06	
1090	45860,00	45566,97	
1091	46073,30	45887,67	
1092	46209,10	46086,15	
1093	46369,20	46225,11	
1094	46424,70	46387,93	
1095	46237,10	46442,34	
1096	46194,30	46246,37	
1097	46927,80	46205,27	
1098	47003,00	46961,62	
1099	46274,70	47020,86	
1100	47081,50	46249,99	
1101	46490,10	47104,86	
1102	46111,10	46487,99	
1103	46451,60	46088,72	
1104	45861,00	46464,75	
1105	44843,90	45854,00	
1106	44332,40	44793,71	
1107	44893,70	44294,82	
1108	44372,00	44909,89	
1109	44629,50	44373,09	
1110	44675,50	44640,19	
1111	45971,80	44696,14	
1112	46367,60	46018,06	
1113	46231,80	46398,19	
1114	46251,20	46225,06	
1115	45952,40	46261,69	
1116	45705,10	45955,04	
1117	45417,10	45701,02	
1118	46010,10	45410,23	
1119	45161,80	46038,10	
1120	46181,40	45147,23	
1121	47093,70	46206,67	
1122	47730,50	47142,62	
1123	48680,30	47758,30	
1124	49476,30	48714,77	
1125	49850,10	49510,01	
1126	49895,30	49864,59	
1127	51281,90	49897,20	
1128	50557,60	51324,69	

Result			
No	d_t	y_t	
1129	50055,50	50546,22	
1130	52005,80	50015,44	
1131	52086,70	52063,06	
1132	51774,40	52110,44	

**Test
Result**

No	d_t	y_t	
1	51643,80	51745,78	
2	51112,00	51639,34	
3	53325,30	51090,50	
4	52935,80	53387,54	
5	55625,40	52944,99	
6	54930,70	55701,97	
7	54831,90	54932,44	
8	52512,40	54791,59	
9	51561,90	52410,93	
10	51459,20	51478,25	
11	52824,90	51436,23	
12	51299,30	52869,24	
13	51393,60	51256,51	
14	50716,40	51359,87	
15	50429,90	50687,32	
16	50708,20	50406,57	
17	52070,60	50716,32	
18	49974,80	52118,52	
19	49186,40	49907,44	
20	50272,50	49108,00	
21	49880,90	50296,43	
22	47714,10	49885,71	
23	44473,30	47613,93	
24	46576,90	44359,03	
25	46148,80	46631,66	
26	45265,00	46172,57	
27	46882,00	45213,24	
28	47388,60	46926,95	
29	46824,00	47430,24	
30	47914,40	46799,54	
31	47750,70	47944,82	
32	48082,20	47764,90	
33	50198,60	48087,02	
34	49936,90	50273,84	
35	50032,60	49949,82	
36	49421,40	50014,94	

Result			
No	d_t	y_t	
37	49601,40	49404,35	
38	49050,40	49603,12	
39	48548,90	49036,23	
40	49296,20	48521,03	
41	49233,10	49318,55	
42	49680,50	49248,22	
43	50620,90	49693,26	
44	50536,50	50658,19	
45	50500,90	50540,77	
46	53884,10	50494,49	
47	53543,10	54000,13	
48	53882,10	53576,69	
49	53580,70	53865,27	
50	52893,20	53580,23	
51	54245,80	52858,80	
52	54390,20	54278,95	
53	54044,20	54409,42	
54	54198,00	54019,07	
55	54733,30	54202,95	
56	54164,90	54756,48	
57	54915,90	54151,19	
58	56793,00	54929,94	
59	56279,10	56859,51	
60	57910,60	56269,28	
61	57418,00	57937,55	
62	58053,40	57413,52	
63	58231,90	58047,87	
64	57185,40	58244,51	
65	57931,90	57137,57	
66	56268,20	57933,76	
67	55486,80	56205,30	
68	53969,80	55411,00	
69	55752,20	53890,43	
70	55638,90	55781,29	
71	55728,60	55654,24	
72	56446,60	55709,50	
73	56774,30	56470,74	
74	57615,70	56788,12	
75	57371,30	57635,06	
76	56855,10	57364,49	
77	56064,30	56822,63	
78	56906,00	56014,74	
79	56076,40	56916,89	
80	55160,80	56054,15	

Result

No	d_t	y_t
81	53689,10	55098,29
82	54084,00	53605,45
83	54719,00	54062,73
84	55664,90	54744,14
85	54743,00	55695,03
86	54304,50	54711,36
87	53262,90	54261,96
88	53577,80	53205,62
89	52615,60	53564,92
90	52199,30	52578,82
91	52331,30	52160,05
92	52682,50	52325,67
93	51452,30	52703,09
94	53202,80	51407,36
95	53181,20	53237,76
96	54213,80	53201,28
97	54320,00	54231,14
98	54013,30	54331,82
99	55521,20	53993,82
100	56186,90	55561,46
101	56490,60	56220,52
102	56518,60	56489,92
103	56271,30	56514,97
104	56766,20	56263,48
105	55239,00	56781,00
106	54911,70	55179,13
107	53603,40	54858,96
108	54223,60	53537,87
109	53847,40	54215,87
110	55510,50	53840,15
111	55380,70	55550,97
112	55373,20	55390,09
113	55233,00	55352,12
114	55698,40	55233,09
115	55538,10	55715,35
116	54708,40	55541,63
117	53541,30	54668,08
118	52529,90	53470,23
119	52569,50	52461,05
120	53235,90	52545,14

Result

No	d_t	y_t
121	52730,70	53260,02
122	52351,00	52722,81
123	51920,60	52325,60
124	51480,90	51894,65
125	50377,30	51454,28
126	49093,80	50320,81
127	48902,80	49018,74
128	48657,50	48868,64
129	45544,10	48643,23
130	44593,70	45423,02
131	42539,50	44527,76
132	45010,70	42504,03
133	45497,20	45071,06
134	43706,70	45558,84
135	44572,70	43637,62
136	44304,40	44572,94
137	42697,60	44312,76
138	44452,10	42628,78
139	45719,90	44490,17
140	44350,80	45797,21
141	43317,50	44310,88
142	41866,40	43249,45
143	41957,90	41806,59
144	41342,80	41940,92
145	43539,90	41326,26
146	44752,50	43610,36
147	45493,70	44839,19
148	44305,30	45544,15
149	45741,70	44266,03
150	46249,30	45772,92
151	45876,70	46291,24
152	46446,60	45861,75
153	45592,50	46467,46
154	44895,00	45576,69
155	45524,50	44852,73
156	46260,30	45539,12
157	45823,30	46300,97
158	44776,90	45817,08
159	43343,60	44728,20
160	42923,00	43272,10

APPENDIX_F

GARCH-MLP RESULTS FOR TRAINING AND TEST

Training Result			Result		
No	d_t	y_t	No	d_t	y_t
1	10161,20	8600,75	36	10815,50	11215,95
2	10225,80	9306,99	37	10841,80	11716,84
3	10204,10	9769,64	38	10961,30	11453,22
4	10412,70	9749,48	39	10817,50	11607,95
5	10124,90	9947,40	40	10744,70	11598,10
6	10280,70	9892,49	41	10614,10	11579,02
7	10467,90	10192,60	42	10666,60	11521,83
8	10348,30	10434,58	43	10604,30	11518,76
9	10590,30	10484,22	44	9482,92	11478,09
10	10570,40	10623,84	45	10581,50	10565,31
11	10544,70	10890,30	46	9938,21	10611,43
12	10881,90	10920,85	47	9644,31	10589,03
13	10825,90	10986,46	48	9406,56	10483,52
14	10931,10	11253,39	49	8892,65	10672,60
15	10742,90	11320,28	50	9187,88	9896,30
16	10725,70	11330,04	51	9408,46	10181,30
17	10945,70	11381,87	52	9572,25	10349,94
18	11032,00	11451,52	53	9631,43	10371,42
19	11122,00	11567,69	54	9475,09	10538,00
20	10658,30	11633,95	55	9773,83	10480,47
21	10659,90	11198,05	56	9804,88	10502,98
22	10921,80	11500,94	57	10153,20	10751,44
23	11013,80	11540,45	58	10415,00	10637,19
24	11302,50	11611,63	59	10743,00	10974,77
25	11775,50	11641,29	60	10512,90	11098,29
26	11607,30	11781,24	61	10886,20	11216,08
27	11669,30	12072,80	62	10629,70	11277,27
28	11754,00	12190,97	63	10565,90	11416,10
29	11392,60	12359,50	64	11103,40	11397,53
30	11272,70	11994,87	65	11169,00	11301,99
31	11291,90	12071,10	66	11366,00	11761,97
32	11486,80	12112,19	67	11219,20	11784,71
33	11574,40	12055,36	68	11254,00	11907,43
34	10128,90	12139,32	69	11504,70	11951,34
35	10616,10	11982,96	70	11405,20	12026,09

Result			
No	d_t	y_t	
71	11119,60	12057,74	
72	11341,40	11814,08	
73	11311,10	11987,65	
74	11436,20	12055,52	
75	11510,00	12011,00	
76	11467,60	12133,88	
77	11300,70	12121,57	
78	11112,10	12031,76	
79	10962,90	11930,40	
80	10676,30	11847,83	
81	10783,90	11561,33	
82	10640,40	11638,92	
83	10712,90	11536,56	
84	10590,70	11504,80	
85	10393,30	11469,64	
86	10229,40	11285,74	
87	10306,30	11226,40	
88	10427,00	11250,52	
89	10540,90	11250,21	
90	10695,20	11278,33	
91	11056,30	11361,22	
92	11125,30	11401,23	
93	11088,90	11712,08	
94	11437,40	11746,41	
95	11407,10	11805,89	
96	11381,40	12040,73	
97	11579,30	12014,02	
98	11346,50	12130,66	
99	11084,70	12022,78	
100	11129,70	11841,10	
101	10973,40	11980,75	
102	10827,80	11821,93	
103	10644,70	11673,16	
104	10597,30	11562,80	
105	10489,20	11532,76	
106	10713,90	11425,73	
107	11036,70	11399,79	
108	11169,20	11479,35	
109	11107,50	11695,11	
110	10902,50	11761,24	
111	10783,90	11679,03	
112	10747,50	11677,42	
113	10756,80	11653,15	
114	10740,20	11604,01	

Result			
No	d_t	y_t	
115	10927,80	11567,77	
116	10981,20	11581,45	
117	10884,40	11687,33	
118	10749,80	11633,78	
119	10690,90	11592,43	
120	10726,60	11587,72	
121	10502,90	11576,86	
122	10351,80	11362,65	
123	10546,90	11296,61	
124	10364,90	11348,87	
125	10399,70	11245,38	
126	10454,90	11257,45	
127	10658,80	11333,06	
128	10918,60	11316,87	
129	10791,40	11426,75	
130	10751,50	11502,19	
131	10856,90	11542,39	
132	10827,30	11634,71	
133	10544,50	11620,59	
134	10463,80	11346,01	
135	10475,20	11422,94	
136	10561,30	11424,30	
137	10598,30	11381,05	
138	10478,30	11399,22	
139	10445,00	11328,18	
140	10572,00	11343,65	
141	10621,20	11379,61	
142	11112,10	11412,83	
143	11499,90	11261,40	
144	11311,10	11676,04	
145	11547,40	11823,94	
146	11558,50	11997,27	
147	11762,30	12219,53	
148	11860,10	12202,31	
149	11916,10	12382,65	
150	11794,90	12432,62	
151	11877,50	12420,52	
152	11661,20	12477,51	
153	11688,90	12349,41	
154	11557,00	12365,58	
155	11845,90	12307,50	
156	12001,10	12270,19	
157	11798,00	12474,34	
158	11735,20	12343,92	

Result			
No	d_t	y_t	
159	11623,40	12413,18	
160	11509,00	12382,49	
161	11611,80	12261,92	
162	11652,80	12281,24	
163	11637,10	12299,14	
164	11671,80	12269,72	
165	11636,50	12308,07	
166	11631,80	12307,27	
167	11581,30	12297,94	
168	11946,70	12279,68	
169	12317,70	12246,49	
170	12507,00	12468,75	
171	12715,20	12727,81	
172	12662,50	12934,78	
173	13005,00	13088,58	
174	12958,20	13149,41	
175	13419,30	13371,64	
176	13663,50	13328,09	
177	13845,00	13771,50	
178	14031,10	13908,60	
179	13798,30	14144,93	
180	13935,70	14112,71	
181	13758,80	14223,52	
182	13255,90	14202,36	
183	13055,90	13663,71	
184	13444,00	13734,45	
185	13880,50	13717,20	
186	14210,20	13809,90	
187	15719,70	14061,91	
188	15482,70	14067,54	
189	15147,80	15241,86	
190	14907,00	15084,93	
191	15420,60	15380,86	
192	15064,80	15347,60	
193	15023,00	15286,80	
194	15382,20	15241,63	
195	15596,80	15439,14	
196	15381,90	15571,53	
197	15358,70	15495,51	
198	15595,30	15585,71	
199	15300,40	15707,35	
200	14829,50	15525,16	
201	14866,30	15138,92	
202	14564,80	15321,42	

Result			
No	d_t	y_t	
203	14673,40	15027,25	
204	15379,70	14965,29	
205	15754,30	14940,00	
206	16341,20	15429,74	
207	16268,30	15654,94	
208	16408,30	16176,28	
209	15536,80	16323,99	
210	15708,10	15656,26	
211	15528,60	16002,49	
212	15224,10	15987,51	
213	15771,40	15516,12	
214	16056,60	15610,38	
215	16080,70	15959,19	
216	15687,10	15997,46	
217	15760,50	15853,80	
218	15780,20	16012,64	
219	14617,50	16046,08	
220	16007,60	14704,80	
221	16242,00	14969,24	
222	16389,60	16183,53	
223	16271,90	15990,23	
224	16504,80	16357,50	
225	16913,30	16483,27	
226	16861,00	16684,01	
227	16614,70	16814,65	
228	16551,60	16714,45	
229	16955,20	16796,99	
230	17410,00	16851,96	
231	17208,50	17046,51	
232	17230,80	17126,35	
233	17742,40	17242,99	
234	18206,10	17459,01	
235	18387,60	17751,80	
236	18242,00	18044,79	
237	18239,90	18167,39	
238	17643,70	18287,73	
239	17996,80	17856,86	
240	17973,90	17990,73	
241	18292,90	18122,42	
242	18625,00	18034,11	
243	19147,70	18356,24	
244	19696,60	18579,97	
245	19013,80	19036,59	
246	19382,80	18843,38	

Result			
No	d_t	y_t	
247	19404,90	19199,27	
248	19926,50	19520,50	
249	19558,80	19434,92	
250	19460,30	19543,87	
251	18818,60	19491,43	
252	18952,20	19123,50	
253	18301,20	19138,57	
254	17788,60	18616,31	
255	18832,80	18118,28	
256	18899,90	18172,19	
257	18518,10	18745,83	
258	18356,50	18345,19	
259	17899,50	18569,28	
260	17902,00	18236,20	
261	17282,30	18152,36	
262	17259,30	17590,14	
263	17033,80	17545,71	
264	16965,80	17402,17	
265	17641,00	17176,63	
266	17418,50	17199,96	
267	18000,30	17404,37	
268	18885,90	17443,81	
269	19000,50	17969,83	
270	19324,50	18539,21	
271	19010,10	18840,44	
272	19478,70	19021,86	
273	18606,00	19156,91	
274	18603,80	18688,66	
275	18284,00	18774,38	
276	18497,70	18703,67	
277	18707,10	18511,75	
278	18771,60	18654,73	
279	18889,20	18654,57	
280	18786,40	18782,16	
281	19356,60	18820,18	
282	19171,90	18928,21	
283	19015,50	19141,30	
284	19165,70	19003,97	
285	19495,40	19216,88	
286	19488,50	19305,46	
287	19798,80	19378,64	
288	19381,40	19523,67	
289	19364,40	19446,62	
290	19526,50	19439,06	

Result			
No	d_t	y_t	
291	19321,60	19593,49	
292	19294,50	19392,85	
293	19611,10	19355,04	
294	20023,80	19499,70	
295	20167,20	19668,45	
296	20185,80	19889,45	
297	20347,80	20034,37	
298	20472,60	20229,91	
299	20836,10	20373,05	
300	20887,00	20528,30	
301	20030,70	20738,69	
302	20190,80	20064,30	
303	20322,20	20371,72	
304	20485,00	20486,82	
305	20330,90	20327,00	
306	20272,90	20336,21	
307	20040,10	20326,17	
308	19419,80	20226,36	
309	19505,20	19677,06	
310	19259,50	19749,32	
311	19104,40	19549,31	
312	18678,20	19255,11	
313	18687,50	18961,80	
314	19269,50	18902,56	
315	19935,70	18959,74	
316	19528,10	19226,91	
317	19270,40	19305,05	
318	19431,50	19323,24	
319	18586,50	19570,39	
320	18217,10	18751,07	
321	18229,70	18587,06	
322	17737,90	18643,58	
323	18022,70	18020,48	
324	17678,30	18040,31	
325	18244,70	17912,85	
326	18272,40	17853,24	
327	17624,10	18248,80	
328	17002,00	17606,27	
329	16807,70	17363,12	
330	17102,50	17364,08	
331	17144,70	17244,06	
332	16645,90	17195,00	
333	16531,30	16748,64	
334	15922,40	16841,31	

Result

No	d _t	y _t
335	16124,30	16310,51
336	16334,20	16366,00
337	16628,80	16466,95
338	17167,40	16438,67
339	16791,10	16671,17
340	17235,50	16752,45
341	17164,00	16940,72
342	17327,90	17274,69
343	17081,10	17215,62
344	16766,80	17235,50
345	16867,50	16993,62
346	17044,40	17090,14
347	17708,20	17106,62
348	18020,30	17110,75
349	17604,10	17626,78
350	17615,60	17493,83
351	17786,40	17720,28
352	17664,50	17877,12
353	17079,80	17738,03
354	17230,50	17244,09
355	17099,00	17446,07
356	16901,40	17379,78
357	16964,10	17076,05
358	16785,40	17136,76
359	16752,80	17006,29
360	16820,00	16922,00
361	16888,60	16963,60
362	17355,20	16956,72
363	17710,40	17040,29
364	17735,50	17378,34
365	17967,60	17558,04
366	18290,30	17776,09
367	18416,40	18049,82
368	18554,80	18233,17
369	18237,60	18390,93
370	18296,70	18314,79
371	18076,90	18374,50
372	18327,10	18295,31
373	18368,40	18269,58
374	18493,00	18391,39
375	18635,20	18386,31
376	18966,20	18550,39
377	19157,30	18700,22
378	18945,00	18936,06

Result

No	d _t	y _t
379	18881,30	18909,93
380	18779,80	18958,59
381	18628,70	18950,60
382	18904,30	18787,09
383	18645,40	18841,13
384	18774,60	18745,87
385	19018,60	18739,76
386	19111,40	18941,24
387	19380,90	18985,20
388	19698,10	19138,42
389	19427,40	19405,72
390	19048,50	19381,56
391	19344,30	19189,07
392	19187,60	19379,03
393	19248,10	19313,79
394	19392,60	19209,00
395	18908,60	19370,40
396	18775,50	19009,65
397	18826,00	18977,91
398	18832,20	19026,80
399	19459,70	18895,79
400	19268,10	18955,14
401	19187,80	19188,31
402	19286,30	19130,03
403	19363,70	19347,72
404	19663,60	19349,03
405	19558,00	19442,13
406	19572,30	19522,22
407	19855,30	19537,32
408	20218,40	19727,15
409	20512,20	19904,80
410	20525,90	20150,23
411	20775,00	20345,58
412	20851,60	20552,17
413	21119,20	20757,53
414	21468,30	20879,41
415	21398,00	21162,21
416	21004,10	21277,04
417	21060,20	21088,46
418	21705,30	21205,17
419	21616,50	21338,11
420	21704,80	21480,28
421	20833,20	21523,70
422	20373,40	21024,55

Result

No	d _t	y _t
423	21192,90	20789,97
425	22276,70	21220,81
426	22307,40	21318,54
427	22083,00	22004,85
428	22293,80	21975,97
429	22219,90	22277,54
430	21953,50	22311,76
431	21722,50	22069,25
432	21987,70	21970,65
433	21612,50	22019,75
434	22287,10	21781,61
435	22432,20	21835,53
436	22951,40	22307,64
437	22787,30	22384,17
438	22289,90	22721,32
439	22630,00	22403,94
440	22318,90	22673,28
441	22477,10	22550,24
442	22334,30	22431,90
443	22550,90	22503,80
444	22220,80	22471,56
445	22201,50	22382,22
446	22244,00	22298,54
447	21907,80	22381,42
448	22142,50	22078,42
449	22565,80	22137,14
450	22899,90	22360,77
451	22857,90	22540,28
452	23215,60	22709,53
453	23437,80	22962,61
454	23006,50	23285,80
455	23215,60	23061,08
456	22616,00	23232,54
457	22544,30	22941,25
458	22618,00	22764,01
459	22186,90	22848,47
460	22104,70	22395,52
461	22566,40	22306,96
462	23132,60	22457,69
463	23176,70	22665,00
464	22931,40	22906,17
465	23472,40	22919,29
466	23516,30	23225,73
467	23464,50	23486,29

Result

No	d _t	y _t
468	23293,20	23394,60
469	22799,20	23459,40
470	22486,20	23114,85
471	22560,90	22885,62
472	23150,10	22832,45
473	23008,10	22856,50
474	23049,50	22939,33
475	23075,60	22960,41
476	22625,40	23167,21
477	22679,90	22832,63
478	22943,70	22846,58
479	23634,80	22970,34
480	23417,90	23083,35
481	23289,70	23301,51
482	23935,20	23285,84
483	24360,60	23654,23
484	24341,40	24023,40
485	24044,60	24132,53
486	24525,30	24156,83
487	24430,80	24414,65
488	24537,70	24544,28
489	24590,80	24481,95
490	24935,80	24687,51
491	24971,70	24802,84
492	25445,20	24971,68
493	25042,00	25162,10
494	24422,90	25201,25
495	24561,90	24744,32
496	25308,30	24936,13
497	25604,70	25040,94
498	26110,20	25307,46
499	26271,30	25622,46
500	26493,00	26126,85
501	26362,70	26363,10
502	26863,20	26521,28
503	26813,10	26724,37
504	26918,10	26957,79
505	26469,40	26954,81
506	26860,00	26864,59
507	27056,00	26949,45
508	27302,70	27203,61
509	27074,10	27222,69
510	27330,40	27295,17
511	27849,80	27427,42

Result			
No	d _t	y _t	
512	27936,50	27770,13	
513	27554,80	27932,26	
514	27813,20	27809,96	
515	28201,70	28034,29	
516	28269,70	28293,74	
517	27528,10	28335,27	
518	27308,80	27928,00	
519	27736,30	27896,86	
520	28003,60	28042,08	
521	28164,10	28067,05	
522	27661,60	28151,94	
523	27000,40	28019,86	
524	27293,20	27609,70	
525	26864,30	27741,66	
526	26657,40	27411,44	
527	26921,30	27033,49	
528	27354,60	27201,21	
529	28031,50	27308,17	
530	28396,20	27610,06	
531	27768,50	28121,76	
532	27226,40	27969,76	
533	27558,90	27793,56	
534	27663,20	27994,38	
535	27789,90	27949,58	
536	27698,30	27862,21	
537	27746,40	27955,39	
538	27519,80	27992,54	
539	27572,80	27919,60	
540	26936,80	27875,61	
541	26547,20	27483,08	
542	25331,70	27132,87	
543	24476,00	26107,54	
544	25348,50	25373,77	
545	24636,70	25467,47	
546	25218,20	25002,48	
547	24439,30	24899,86	
548	25068,50	24849,64	
549	25502,60	24812,23	
550	24842,20	25424,07	
551	24479,70	24873,50	
552	24600,90	24836,31	
553	25557,80	24987,83	
554	25740,80	25005,23	
555	25445,10	25467,52	

Result			
No	d _t	y _t	
556	25682,50	25387,31	
557	26056,60	25751,21	
558	25831,20	26024,85	
559	25786,50	25932,54	
560	25370,30	25949,22	
561	25078,00	25801,07	
562	25293,20	25513,40	
563	24542,00	25549,08	
564	23853,30	24937,18	
565	23285,90	24350,82	
566	24143,90	24028,10	
567	24175,90	23944,72	
568	24419,40	24177,94	
569	24730,80	24108,82	
570	24798,10	24577,21	
571	24484,00	24722,63	
572	24070,10	24630,00	
573	23519,60	24428,98	
574	23591,60	24039,86	
575	24253,00	23949,29	
576	24137,90	24014,14	
577	24560,20	24074,66	
578	25099,90	24226,51	
579	24950,80	24765,21	
580	24702,20	24865,22	
581	24688,30	24830,71	
582	24662,90	24958,21	
583	25114,40	24894,25	
584	25325,70	24967,70	
585	24921,30	25222,34	
586	24846,10	25026,33	
587	25205,50	25090,15	
588	25464,90	25278,20	
589	24329,10	25379,84	
590	24140,90	24498,42	
591	24119,80	24626,43	
592	24054,10	24665,17	
593	24453,10	24263,94	
594	24977,80	24334,47	
595	25236,50	24642,17	
596	25230,80	24937,83	
597	25799,10	25143,50	
598	26051,60	25492,33	
599	25533,10	25910,67	

Result			
No	d _t	y _t	
600	25478,00	25650,60	
601	25779,80	25764,45	
602	25500,00	25954,13	
603	25725,20	25723,56	
604	25610,00	25761,45	
605	25929,90	25863,83	
606	26209,40	25879,72	
607	26579,70	26171,82	
608	26529,30	26367,53	
609	26709,20	26570,52	
610	26746,40	26729,27	
611	26779,30	26916,91	
612	27021,50	26926,17	
613	27033,40	27095,28	
614	26597,80	27186,34	
615	26811,40	26931,85	
616	27135,90	27052,58	
617	26957,30	27250,41	
618	27616,90	27119,32	
619	27702,30	27363,69	
620	27377,60	27780,73	
621	27781,40	27557,47	
622	27689,50	27876,29	
623	27842,40	27994,80	
624	27808,10	27941,01	
625	27689,20	28095,23	
626	28061,90	27995,63	
627	28500,90	28167,90	
628	28427,30	28449,40	
629	28402,70	28527,16	
630	28675,40	28618,02	
631	28713,50	28868,38	
632	28992,10	28946,92	
633	29188,10	29066,64	
634	29273,30	29326,55	
635	28730,70	29434,99	
636	29164,80	29207,43	
637	29343,00	29379,11	
638	29615,30	29636,70	
639	29776,70	29629,82	
640	29543,50	29924,01	
641	29727,10	29897,90	
642	30123,60	30023,58	
643	29945,40	30285,39	

Result			
No	d _t	y _t	
644	29924,80	30247,62	
645	29701,00	30259,88	
646	29683,20	30260,16	
647	29111,80	30152,57	
648	28175,90	29785,04	
649	28074,90	28981,80	
650	28257,70	28913,27	
651	27906,30	28790,51	
652	28000,00	28337,62	
653	28456,90	28297,40	
654	28951,40	28552,77	
655	29191,60	28785,48	
656	29372,20	29098,41	
657	29814,20	29396,64	
658	30020,40	29776,38	
659	30015,10	30096,13	
660	30908,00	30209,82	
661	31948,00	30607,97	
662	31701,60	31346,02	
663	31879,50	31686,67	
664	31832,50	31998,46	
665	31385,00	32352,07	
666	31485,40	32003,54	
667	32202,70	32041,21	
668	32711,10	32295,23	
669	32541,10	32627,32	
670	32632,40	32742,26	
671	33271,10	32971,48	
672	33294,30	33380,62	
673	33221,20	33572,22	
674	33719,30	33566,63	
675	33863,80	33937,92	
676	33465,60	34177,86	
677	33250,50	33969,75	
678	33516,00	33946,12	
679	33319,20	34063,98	
680	32745,00	33918,32	
681	33396,20	33469,52	
682	33333,20	33709,15	
683	34300,90	33860,90	
684	35624,80	33948,74	
685	34775,70	34874,39	
686	33510,40	34943,86	
687	33413,60	34246,00	

Result			
No	d _t	y _t	
688	33506,00	34619,41	
689	34040,20	34390,67	
690	33118,40	34225,80	
691	32054,30	33773,48	
692	31440,00	32999,34	
693	31850,70	32774,25	
694	31586,80	32585,58	
695	30766,70	32246,66	
696	31403,90	31458,29	
697	31428,60	31758,84	
698	31845,70	31932,07	
699	31670,00	31843,29	
700	31474,40	32089,14	
701	31273,30	31956,49	
702	31038,50	31943,34	
703	31964,00	31723,03	
704	32792,00	31886,05	
705	33152,10	32490,14	
706	33830,10	32898,27	
707	33749,40	33531,86	
708	33848,30	33997,79	
709	34709,70	34132,15	
710	34096,30	34637,87	
711	34171,50	34594,97	
712	34324,00	34577,33	
713	34866,60	34932,13	
714	35127,30	34987,59	
715	35314,30	35303,40	
716	35655,00	35501,36	
717	35254,10	35853,01	
718	36179,30	35814,46	
719	36907,80	36082,73	
720	36759,90	36806,51	
721	36621,50	36865,68	
722	37495,20	37033,96	
723	38088,70	37495,32	
724	38296,90	37998,42	
725	38573,70	38229,04	
726	39130,70	38641,77	
727	38917,80	39086,24	
728	38441,60	39214,21	
729	38587,80	38993,41	
730	37496,20	39143,84	
731	38202,20	38441,30	

Result			
No	d _t	y _t	
732	37741,70	38484,32	
733	37870,60	38544,04	
734	37631,60	38203,75	
735	37716,70	38328,22	
736	37960,10	38185,22	
737	37729,40	38347,26	
738	38210,20	38229,68	
739	38353,10	38387,09	
740	38919,50	38669,38	
741	39139,10	38837,71	
742	39015,90	39243,17	
743	39220,20	39275,53	
744	39837,30	39491,11	
745	39777,70	39823,46	
746	39790,70	39955,72	
747	40665,40	39995,83	
748	41362,50	40441,65	
749	41722,40	40966,57	
750	41905,40	41315,12	
751	43628,80	41709,23	
752	44076,90	42259,15	
753	42622,90	43275,80	
754	43645,20	42514,65	
755	44465,70	43211,59	
756	43851,40	43960,76	
757	44434,50	43531,82	
758	45746,20	43886,50	
759	45784,10	44582,87	
760	45315,20	44911,89	
761	44891,30	44819,05	
762	44590,20	44874,33	
763	45250,70	44699,01	
764	44841,00	44755,88	
765	44228,00	44665,31	
766	44855,60	44218,28	
767	44653,00	44513,60	
768	43842,70	44520,59	
769	44117,50	43905,63	
770	44772,90	44084,34	
771	44046,30	44330,49	
772	43507,50	43952,92	
773	43804,00	43663,96	
774	45361,30	43878,47	
775	46244,30	44110,34	

Result

No	d _t	y _t
776	46689,00	44854,49
777	46710,90	45313,84
778	46265,40	45785,17
779	46553,60	45789,09
780	46838,10	45928,73
781	47728,50	46111,48
782	47015,90	46319,25
783	47493,00	46310,85
784	46890,80	46429,10
785	46366,20	46495,37
786	45997,10	46011,87
787	43889,80	45906,03
788	42340,40	44288,01
789	42863,40	43364,53
790	42521,90	43524,29
791	44346,00	43025,86
792	42906,70	42877,23
793	43236,70	42975,27
794	44051,30	42941,81
795	44688,10	43767,10
796	44426,30	43865,40
797	44399,40	43998,80
798	44328,80	44130,91
799	44531,20	44258,82
800	43273,90	44257,86
801	42710,50	43576,75
802	41742,10	43225,81
803	42507,00	42692,51
804	42941,70	42548,68
805	42911,30	42825,49
806	44028,40	42665,14
807	44070,90	43148,69
808	44088,60	43674,60
809	43710,60	43660,05
810	44284,20	43769,91
811	43099,30	43911,38
812	42890,30	43413,94
813	42505,00	43151,51
814	41919,30	43103,79
815	42212,00	42450,88
816	41860,70	42438,07
817	42864,90	42259,67
818	43732,50	42327,84
819	43872,80	43027,45

Result

No	d _t	y _t
820	45075,90	43253,78
821	45278,40	43834,07
822	45352,50	44552,46
823	44745,50	44636,11
824	43752,00	44651,25
825	43880,40	44088,91
826	44030,40	44095,96
827	44413,60	44056,82
828	44647,80	43979,63
829	44251,40	44194,31
830	44212,80	44097,84
831	44712,90	44109,21
832	44563,30	44338,33
833	43599,00	44313,59
834	43713,20	43750,02
835	41970,80	43843,91
836	40268,70	42703,27
837	41044,10	41342,20
838	40439,20	41729,48
839	39643,70	41251,58
840	36351,10	40251,15
841	37235,50	37012,04
842	36100,70	38278,46
843	36730,20	37713,55
844	38593,50	36911,08
845	38908,60	37693,07
846	37860,80	38471,21
847	38132,20	38064,52
848	38395,20	38645,04
849	39285,80	38931,58
850	37964,00	38977,57
851	37464,40	38503,89
852	36709,60	38274,15
853	35338,70	38037,00
854	34802,60	36614,78
855	34330,30	36189,34
856	32384,40	35643,26
857	32899,70	33505,30
858	33627,40	33805,09
859	34048,00	34096,98
860	34807,70	33935,09
861	34601,40	34478,80
862	33762,00	34881,29
863	34229,00	34429,64

Result

No	d _t	y _t
864	33132,30	34778,04
865	31950,60	34125,08
866	32470,40	32976,56
867	33207,10	33325,90
868	34031,10	33419,52
869	35453,30	33597,94
870	35456,50	34392,78
871	36481,20	35318,56
872	35385,00	35855,77
873	35698,70	35985,96
874	36202,20	36057,29
875	36148,40	36656,25
876	35955,80	36463,28
877	35815,50	36443,57
878	35010,50	36486,64
879	33831,70	35950,70
880	32702,90	35003,31
881	33618,00	34165,72
882	33554,40	34181,15
883	35311,00	34178,51
884	34988,80	34076,76
885	34959,00	35174,29
886	35264,40	35069,77
887	35984,50	35724,71
888	36747,30	35963,17
889	36101,90	36468,97
890	36067,90	36459,55
891	35742,80	36570,35
892	35721,60	36626,83
893	35262,90	36367,10
894	36159,60	36103,94
895	35967,50	36212,32
896	36535,70	36468,14
897	37563,30	36491,84
898	37389,30	37248,83
899	37418,10	37514,84
900	37631,10	37647,34
901	37806,50	38045,28
902	38433,40	38126,07
903	37885,30	38398,83
904	37384,80	38368,61
905	37164,90	38063,23
906	37130,80	38069,63

Test Result

No	d _t	y _t
1	51643,80	49507,84
2	51112,00	49799,81
3	53325,30	49592,24
4	52935,80	49758,34
5	55625,40	50442,48
6	54930,70	50482,03
7	54831,90	51701,64
8	52512,40	51457,00
9	51561,90	50665,88
10	51459,20	50274,80
11	52824,90	50215,08
12	51299,30	50083,46
13	51393,60	49568,92
14	50716,40	49503,83
15	50429,90	49548,04
16	50708,20	49065,90
17	52070,60	49150,08
18	49974,80	49375,37
19	49186,40	48537,87
20	50272,50	48288,54
21	49880,90	48809,87
22	47714,10	48574,17
23	44473,30	46980,56
24	46576,90	44624,70
25	46148,80	45704,05
26	45265,00	46107,20
27	46882,00	44791,23
28	47388,60	45538,53
29	46824,00	46260,47
30	47914,40	45891,61
31	47750,70	46461,66
32	48082,20	46869,22
33	50198,60	46800,11
34	49936,90	47425,66
35	50032,60	48145,86
36	49421,40	48156,94
37	49601,40	48369,38
38	49050,40	48301,35
39	48548,90	48142,50
40	49296,20	47728,75
41	49233,10	47928,98
42	49680,50	48000,13
43	50620,90	48004,93
44	50536,50	48515,85

Result

No	d_t	y_t
45	50500,90	48718,53
46	53884,10	48759,76
47	53543,10	48975,51
48	53882,10	50538,32
49	53580,70	50501,13
50	52893,20	51106,78
51	54245,80	50725,12
52	54390,20	51005,06
53	54044,20	51395,09
54	54198,00	51138,52
55	54733,30	51380,87
56	54164,90	51589,55
57	54915,90	51425,44
58	56793,00	51567,02
59	56279,10	52145,35
60	57910,60	52418,42
61	57418,00	52734,53
62	58053,40	53331,86
63	58231,90	53311,03
64	57185,40	53751,91
65	57931,90	53299,45
66	56268,20	53500,48
67	55486,80	52993,83
68	53969,80	52488,42
69	55752,20	51903,46
70	55638,90	51908,96
71	55728,60	52330,33
72	56446,60	52034,89
73	56774,30	52538,83
74	57615,70	52758,47
75	57371,30	53012,12
76	56855,10	53220,71
77	56064,30	53045,68
78	56906,00	52840,95
79	56076,40	52944,98
80	55160,80	52761,34
81	53689,10	52183,98
82	54084,00	51611,43
83	54719,00	51570,10
84	55664,90	51699,13
85	54743,00	51793,91
86	54304,50	51707,91
87	53262,90	51561,07
88	53577,80	51262,37

Result

No	d_t	y_t
89	52615,60	51135,13
90	52199,30	50745,39
91	52331,30	50314,62
92	52682,50	50387,74
93	51452,30	50350,43
94	53202,80	49776,07
95	53181,20	50031,02
96	54213,80	50704,21
97	54320,00	50672,38
98	54013,30	51292,99
99	55521,20	51173,06
100	56186,90	51605,65
101	56490,60	52230,29
102	56518,60	52362,32
103	56271,30	52664,56
104	56766,20	52691,38
105	55239,00	52838,44
106	54911,70	52283,83
107	53603,40	52073,89
108	54223,60	51586,70
109	53847,40	51445,02
110	55510,50	51424,55
111	55380,70	51428,20
112	55373,20	51999,47
113	55233,00	51868,88
114	55698,40	52114,20
115	55538,10	52199,45
116	54708,40	52240,08
117	53541,30	51863,04
118	52529,90	51376,93
119	52569,50	50877,25
120	53235,90	50704,24
121	52730,70	50708,35
122	52351,00	50481,47
123	51920,60	50268,01
124	51480,90	50193,00
125	50377,30	49883,72
126	49093,80	49258,31
127	48902,80	48478,55
128	48657,50	48294,29
129	45544,10	47975,96
130	44593,70	45206,16
131	42539,50	45359,12
132	45010,70	43888,28

Result			
No	d _t	y _t	
133	45497,20	43512,67	
134	43706,70	44839,55	
135	44572,70	43256,26	
136	44304,40	44170,09	
137	42697,60	44488,77	
138	44452,10	42965,01	
139	45719,90	43514,32	
140	44350,80	44576,53	
141	43317,50	43807,06	
142	41866,40	43602,46	
143	41957,90	42975,03	
144	41342,80	42687,01	
145	43539,90	42161,10	
146	44752,50	41954,00	

Result			
No	d _t	y _t	
147	45493,70	43448,66	
148	44305,30	43918,24	
149	45741,70	44004,17	
150	46249,30	44538,40	
151	45876,70	45461,68	
152	46446,60	45114,52	
153	45592,50	45572,30	
154	44895,00	45430,15	
155	45524,50	44907,51	
156	46260,30	45183,58	
157	45823,30	45399,54	
158	44776,90	45236,65	
159	43343,60	44750,16	
160	42923,00	44004,62	

APPENDIX_G

EGARCH-MLP RESULTS FOR TRAINING AND TEST

Training			Result		
Result					
No	d_t	y_t	No	d_t	y_t
1	10161,20	11236,17	37	10841,80	11539,06
2	10225,80	7710,99	38	10961,30	11499,02
3	10204,10	8746,33	39	10817,50	11643,58
4	10412,70	9891,35	40	10744,70	11620,07
5	10124,90	10671,36	41	10614,10	11588,08
6	10280,70	10883,06	42	10666,60	11510,49
7	10467,90	11063,41	43	10604,30	11489,19
8	10348,30	11198,30	44	9482,92	11442,80
9	10590,30	11186,15	45	10581,50	10944,17
10	10570,40	11329,15	46	9938,21	11265,79
11	10544,70	11357,15	47	9644,31	10976,12
12	10881,90	11366,71	48	9406,56	10813,00
13	10825,90	11532,58	49	8892,65	10692,27
14	10931,10	11546,02	50	9187,88	10331,23
15	10742,90	11632,13	51	9408,46	10326,96
16	10725,70	11588,62	52	9572,25	10371,23
17	10945,70	11563,55	53	9631,43	10464,47
18	11032,00	11639,15	54	9475,09	10576,32
19	11122,00	11684,21	55	9773,83	10561,41
20	10658,30	11767,91	56	9804,88	10689,78
21	10659,90	11611,00	57	10153,20	10724,75
22	10921,80	11571,93	58	10415,00	10903,56
23	11013,80	11624,20	59	10743,00	11098,03
24	11302,50	11652,30	60	10512,90	11326,52
25	11775,50	11834,89	61	10886,20	11340,74
26	11607,30	12126,52	62	10629,70	11545,01
27	11669,30	12166,49	63	10565,90	11477,27
28	11754,00	12273,66	64	11103,40	11444,07
29	11392,60	12338,88	65	11169,00	11669,36
30	11272,70	12175,28	66	11366,00	11733,57
31	11291,90	12092,99	67	11219,20	11904,67
32	11486,80	12036,81	68	11254,00	11930,50
33	11574,40	12069,62	69	11504,70	11959,22
34	10128,90	12128,35	70	11405,20	12070,46
35	10616,10	11532,32	71	11119,60	12047,72
36	10815,50	11594,17	72	11341,40	11949,75

Result			
No	d_t	y_t	
73	11311,10	12019,81	
74	11436,20	11980,41	
75	11510,00	12036,70	
76	11467,60	12106,57	
77	11300,70	12112,80	
78	11112,10	12056,74	
79	10962,90	11950,65	
80	10676,30	11828,37	
81	10783,90	11636,40	
82	10640,40	11604,78	
83	10712,90	11500,41	
84	10590,70	11502,32	
85	10393,30	11451,10	
86	10229,40	11345,69	
87	10306,30	11238,74	
88	10427,00	11208,56	
89	10540,90	11228,60	
90	10695,20	11291,42	
91	11056,30	11401,66	
92	11125,30	11609,95	
93	11088,90	11722,54	
94	11437,40	11784,13	
95	11407,10	11978,75	
96	11381,40	12010,10	
97	11579,30	12042,22	
98	11346,50	12157,12	
99	11084,70	12069,53	
100	11129,70	11949,43	
101	10973,40	11918,13	
102	10827,80	11789,55	
103	10644,70	11686,01	
104	10597,30	11569,58	
105	10489,20	11487,35	
106	10713,90	11393,33	
107	11036,70	11453,24	
108	11169,20	11606,95	
109	11107,50	11732,94	
110	10902,50	11795,86	
111	10783,90	11748,48	
112	10747,50	11669,86	
113	10756,80	11598,16	
114	10740,20	11558,28	
115	10927,80	11536,34	
116	10981,20	11615,75	

Result			
No	d_t	y_t	
117	10884,40	11663,99	
118	10749,80	11655,30	
119	10690,90	11610,52	
120	10726,60	11556,03	
121	10502,90	11532,68	
122	10351,80	11417,64	
123	10546,90	11323,06	
124	10364,90	11358,73	
125	10399,70	11261,34	
126	10454,90	11268,07	
127	10658,80	11291,18	
128	10918,60	11373,50	
129	10791,40	11527,59	
130	10751,50	11542,34	
131	10856,90	11567,16	
132	10827,30	11612,92	
133	10544,50	11592,25	
134	10463,80	11475,96	
135	10475,20	11409,85	
136	10561,30	11357,83	
137	10598,30	11356,47	
138	10478,30	11380,14	
139	10445,00	11348,26	
140	10572,00	11332,54	
141	10621,20	11368,70	
142	11112,10	11389,82	
143	11499,90	11627,84	
144	11311,10	11887,51	
145	11547,40	11932,90	
146	11558,50	12121,92	
147	11762,30	12164,46	
148	11860,10	12269,40	
149	11916,10	12366,26	
150	11794,90	12435,48	
151	11877,50	12423,60	
152	11661,20	12461,47	
153	11688,90	12360,23	
154	11557,00	12343,18	
155	11845,90	12262,75	
156	12001,10	12356,09	
157	11798,00	12449,48	
158	11735,20	12410,43	
159	11623,40	12410,49	
160	11509,00	12333,85	

Result			
No	d_t	y_t	
161	11611,80	12234,82	
162	11652,80	12242,20	
163	11637,10	12246,09	
164	11671,80	12250,02	
165	11636,50	12281,79	
166	11631,80	12272,13	
167	11581,30	12268,66	
168	11946,70	12243,38	
169	12317,70	12395,87	
170	12507,00	12605,95	
171	12715,20	12795,01	
172	12662,50	13013,41	
173	13005,00	13083,65	
174	12958,20	13284,11	
175	13419,30	13319,78	
176	13663,50	13575,44	
177	13845,00	13782,05	
178	14031,10	13969,85	
179	13798,30	14172,14	
180	13935,70	14139,94	
181	13758,80	14220,81	
182	13255,90	14133,87	
183	13055,90	13868,10	
184	13444,00	13691,59	
185	13880,50	13741,10	
186	14210,20	13915,95	
187	15719,70	14180,58	
188	15482,70	15072,43	
189	15147,80	15276,67	
190	14907,00	15374,64	
191	15420,60	15325,90	
192	15064,80	15445,88	
193	15023,00	15263,64	
194	15382,20	15257,81	
195	15596,80	15422,16	
196	15381,90	15531,31	
197	15358,70	15515,11	
198	15595,30	15550,87	
199	15300,40	15647,46	
200	14829,50	15506,12	
201	14866,30	15273,29	
202	14564,80	15198,76	
203	14673,40	14942,40	
204	15379,70	14909,09	

Result			
No	d_t	y_t	
205	15754,30	15222,94	
206	16341,20	15497,77	
207	16268,30	15981,39	
208	16408,30	16172,90	
209	15536,80	16374,59	
210	15708,10	16003,36	
211	15528,60	15977,39	
212	15224,10	15771,98	
213	15771,40	15529,24	
214	16056,60	15746,02	
215	16080,70	15896,29	
216	15687,10	16014,07	
217	15760,50	15933,53	
218	15780,20	15946,86	
219	14617,50	15897,19	
220	16007,60	15293,80	
221	16242,00	15820,43	
222	16389,60	15950,42	
223	16271,90	16173,24	
224	16504,80	16334,18	
225	16913,30	16480,21	
226	16861,00	16712,26	
227	16614,70	16772,13	
228	16551,60	16738,40	
229	16955,20	16704,31	
230	17410,00	16846,20	
231	17208,50	17099,71	
232	17230,80	17130,43	
233	17742,40	17241,03	
234	18206,10	17518,69	
235	18387,60	17815,78	
236	18242,00	18077,16	
237	18239,90	18169,97	
238	17643,70	18229,23	
239	17996,80	17905,54	
240	17973,90	17981,49	
241	18292,90	17912,74	
242	18625,00	18075,20	
243	19147,70	18336,29	
244	19696,60	18720,34	
245	19013,80	19192,36	
246	19382,80	19040,90	
247	19404,90	19295,96	
248	19926,50	19292,79	

Result			
No	d _t	y _t	
249	19558,80	19566,66	
250	19460,30	19494,50	
251	18818,60	19486,17	
252	18952,20	19113,27	
253	18301,20	19024,80	
254	17788,60	18568,46	
255	18832,80	18157,11	
256	18899,90	18520,72	
257	18518,10	18554,54	
258	18356,50	18502,96	
259	17899,50	18492,29	
260	17902,00	18159,53	
261	17282,30	18018,11	
262	17259,30	17594,91	
263	17033,80	17443,18	
264	16965,80	17213,48	
265	17641,00	17074,09	
266	17418,50	17369,96	
267	18000,30	17321,23	
268	18885,90	17708,06	
269	19000,50	18295,52	
270	19324,50	18571,16	
271	19010,10	18992,15	
272	19478,70	18988,73	
273	18606,00	19259,68	
274	18603,80	18836,54	
275	18284,00	18756,48	
276	18497,70	18474,99	
277	18707,10	18439,51	
278	18771,60	18526,48	
279	18889,20	18598,44	
280	18786,40	18735,88	
281	19356,60	18734,08	
282	19171,90	19050,09	
283	19015,50	19031,89	
284	19165,70	19015,63	
285	19495,40	19100,05	
286	19488,50	19247,03	
287	19798,80	19304,85	
288	19381,40	19551,05	
289	19364,40	19407,59	
290	19526,50	19391,51	
291	19321,60	19430,32	
292	19294,50	19293,54	

Result			
No	d _t	y _t	
293	19611,10	19277,88	
294	20023,80	19423,52	
295	20167,20	19667,57	
296	20185,80	19867,62	
297	20347,80	20014,21	
298	20472,60	20177,29	
299	20836,10	20287,69	
300	20887,00	20538,31	
301	20030,70	20664,57	
302	20190,80	20282,56	
303	20322,20	20287,58	
304	20485,00	20224,35	
305	20330,90	20268,36	
306	20272,90	20255,59	
307	20040,10	20246,43	
308	19419,80	20098,27	
309	19505,20	19696,27	
310	19259,50	19596,67	
311	19104,40	19334,94	
312	18678,20	19162,93	
313	18687,50	18878,36	
314	19269,50	18763,30	
315	19935,70	18978,39	
316	19528,10	19383,35	
317	19270,40	19378,30	
318	19431,50	19370,69	
319	18586,50	19410,85	
320	18217,10	18883,97	
321	18229,70	18564,88	
322	17737,90	18375,68	
323	18022,70	17957,53	
324	17678,30	17997,99	
325	18244,70	17775,74	
326	18272,40	18018,77	
327	17624,10	18090,91	
328	17002,00	17821,57	
329	16807,70	17474,25	
330	17102,50	17164,05	
331	17144,70	17099,11	
332	16645,90	17064,24	
333	16531,30	16852,08	
334	15922,40	16764,86	
335	16124,30	16354,63	
336	16334,20	16291,84	

Result			
No	d _t	y _t	
337	16628,80	16308,27	
338	17167,40	16458,46	
339	16791,10	16839,56	
340	17235,50	16802,81	
341	17164,00	17104,68	
342	17327,90	17122,54	
343	17081,10	17231,63	
344	16766,80	17164,99	
345	16867,50	16987,87	
346	17044,40	16965,28	
347	17708,20	16985,10	
348	18020,30	17336,59	
349	17604,10	17644,38	
350	17615,60	17615,08	
351	17786,40	17690,20	
352	17664,50	17733,70	
353	17079,80	17648,55	
354	17230,50	17361,48	
355	17099,00	17349,53	
356	16901,40	17183,44	
357	16964,10	17026,19	
358	16785,40	17024,99	
359	16752,80	16893,21	
360	16820,00	16841,11	
361	16888,60	16846,44	
362	17355,20	16866,02	
363	17710,40	17124,31	
364	17735,50	17397,96	
365	17967,60	17556,52	
366	18290,30	17797,46	
367	18416,40	18042,00	
368	18554,80	18199,57	
369	18237,60	18375,86	
370	18296,70	18286,44	
371	18076,90	18307,43	
372	18327,10	18155,28	
373	18368,40	18227,82	
374	18493,00	18254,37	
375	18635,20	18348,62	
376	18966,20	18479,18	
377	19157,30	18703,33	
378	18945,00	18895,77	
379	18881,30	18888,30	
380	18779,80	18893,87	

Result			
No	d _t	y _t	
381	18628,70	18809,04	
382	18904,30	18676,02	
383	18645,40	18773,32	
384	18774,60	18638,75	
385	19018,60	18703,97	
386	19111,40	18836,35	
387	19380,90	18917,77	
388	19698,10	19137,41	
389	19427,40	19393,88	
390	19048,50	19356,11	
391	19344,30	19200,51	
392	19187,60	19282,58	
393	19248,10	19140,59	
394	19392,60	19163,33	
395	18908,60	19255,27	
396	18775,50	19010,92	
397	18826,00	18901,67	
398	18832,20	18832,73	
399	19459,70	18764,40	
400	19268,10	19096,66	
401	19187,80	19099,05	
402	19286,30	19146,82	
403	19363,70	19220,31	
404	19663,60	19237,36	
405	19558,00	19419,99	
406	19572,30	19435,01	
407	19855,30	19491,74	
408	20218,40	19659,33	
409	20512,20	19889,93	
410	20525,90	20162,49	
411	20775,00	20316,34	
412	20851,60	20550,66	
413	21119,20	20664,71	
414	21468,30	20871,82	
415	21398,00	21149,41	
416	21004,10	21223,70	
417	21060,20	21089,28	
418	21705,30	21081,99	
419	21616,50	21363,24	
420	21704,80	21383,19	
421	20833,20	21551,75	
422	20373,40	21131,99	
423	21192,90	20748,39	
424	21491,40	20966,09	

Result			
No	d _t	y _t	
425	22276,70	21079,80	
426	22307,40	21677,80	
427	22083,00	21972,51	
428	22293,80	22033,94	
429	22219,90	22207,38	
430	21953,50	22154,39	
431	21722,50	22006,43	
432	21987,70	21843,21	
433	21612,50	21894,47	
434	22287,10	21651,60	
435	22432,20	21998,06	
436	22951,40	22147,35	
437	22787,30	22555,03	
438	22289,90	22648,21	
439	22630,00	22453,93	
440	22318,90	22590,59	
441	22477,10	22350,88	
442	22334,30	22402,30	
443	22550,90	22325,14	
444	22220,80	22421,10	
445	22201,50	22258,86	
446	22244,00	22222,04	
447	21907,80	22202,88	
448	22142,50	21978,81	
449	22565,80	22064,98	
450	22899,90	22281,99	
451	22857,90	22548,96	
452	23215,60	22688,34	
453	23437,80	22997,72	
454	23006,50	23209,44	
455	23215,60	23059,88	
456	22616,00	23193,08	
457	22544,30	22821,08	
458	22618,00	22677,28	
459	22186,90	22614,36	
460	22104,70	22300,95	
461	22566,40	22195,14	
462	23132,60	22368,11	
463	23176,70	22702,28	
464	22931,40	22901,70	
465	23472,40	22930,89	
466	23516,30	23270,36	
467	23464,50	23337,41	
468	23293,20	23392,35	

Result			
No	d _t	y _t	
469	22799,20	23353,42	
470	22486,20	23034,95	
471	22560,90	22737,57	
472	23150,10	22614,21	
473	23008,10	22847,18	
474	23049,50	22843,77	
475	23075,60	22971,01	
476	22625,40	23029,72	
477	22679,90	22766,44	
478	22943,70	22735,14	
479	23634,80	22808,83	
480	23417,90	23208,49	
481	23289,70	23254,41	
482	23935,20	23311,59	
483	24360,60	23693,95	
484	24341,40	23994,56	
485	24044,60	24164,38	
486	24525,30	24142,77	
487	24430,80	24413,92	
488	24537,70	24374,22	
489	24590,80	24482,80	
490	24935,80	24565,22	
491	24971,70	24784,84	
492	25445,20	24883,82	
493	25042,00	25241,24	
494	24422,90	25124,04	
495	24561,90	24792,09	
496	25308,30	24743,55	
497	25604,70	25035,72	
498	26110,20	25294,71	
499	26271,30	25807,28	
500	26493,00	26124,37	
501	26362,70	26411,35	
502	26863,20	26452,86	
503	26813,10	26787,97	
504	26918,10	26835,96	
505	26469,40	26974,06	
506	26860,00	26765,39	
507	27056,00	26939,00	
508	27302,70	27042,73	
509	27074,10	27251,38	
510	27330,40	27235,11	
511	27849,80	27420,03	
512	27936,50	27753,55	

Result			
No	d_t	y_t	
513	27554,80	27915,57	
514	27813,20	27828,52	
515	28201,70	27992,53	
516	28269,70	28200,70	
517	27528,10	28314,72	
518	27308,80	27981,62	
519	27736,30	27784,55	
520	28003,60	27864,71	
521	28164,10	27975,03	
522	27661,60	28178,36	
523	27000,40	27999,37	
524	27293,20	27580,40	
525	26864,30	27564,63	
526	26657,40	27173,02	
527	26921,30	26969,58	
528	27354,60	27042,21	
529	28031,50	27259,28	
530	28396,20	27768,72	
531	27768,50	28213,38	
532	27226,40	28069,76	
533	27558,90	27784,61	
534	27663,20	27806,91	
535	27789,90	27750,67	
536	27698,30	27853,56	
537	27746,40	27876,32	
538	27519,80	27925,96	
539	27572,80	27792,19	
540	26936,80	27786,66	
541	26547,20	27373,90	
542	25331,70	27025,50	
543	24476,00	26121,00	
544	25348,50	25279,68	
545	24636,70	25369,12	
546	25218,20	24801,27	
547	24439,30	25112,58	
548	25068,50	24708,98	
549	25502,60	24987,99	
550	24842,20	25258,96	
551	24479,70	24977,28	
552	24600,90	24815,93	
553	25557,80	24742,48	
554	25740,80	25177,76	
555	25445,10	25430,28	
556	25682,50	25488,61	

Result			
No	d_t	y_t	
557	26056,60	25720,19	
558	25831,20	25938,17	
559	25786,50	25878,13	
560	25370,30	25914,83	
561	25078,00	25655,86	
562	25293,20	25381,82	
563	24542,00	25373,88	
564	23853,30	24865,22	
565	23285,90	24356,42	
566	24143,90	23794,82	
567	24175,90	23978,93	
568	24419,40	23957,43	
569	24730,80	24215,05	
570	24798,10	24539,58	
571	24484,00	24678,95	
572	24070,10	24592,55	
573	23519,60	24346,30	
574	23591,60	23904,22	
575	24253,00	23740,49	
576	24137,90	23982,32	
577	24560,20	23979,66	
578	25099,90	24348,32	
579	24950,80	24782,97	
580	24702,20	24851,15	
581	24688,30	24833,16	
582	24662,90	24811,61	
583	25114,40	24726,58	
584	25325,70	24956,55	
585	24921,30	25149,08	
586	24846,10	25031,41	
587	25205,50	25012,95	
588	25464,90	25152,65	
589	24329,10	25304,60	
590	24140,90	24740,23	
591	24119,80	24541,27	
592	24054,10	24301,66	
593	24453,10	24098,70	
594	24977,80	24299,02	
595	25236,50	24658,07	
596	25230,80	24968,15	
597	25799,10	25153,99	
598	26051,60	25594,40	
599	25533,10	25861,25	
600	25478,00	25703,41	

Result			
No	d _t	y _t	
601	25779,80	25697,59	
602	25500,00	25788,84	
603	25725,20	25604,29	
604	25610,00	25746,84	
605	25929,90	25693,19	
606	26209,40	25877,28	
607	26579,70	26097,54	
608	26529,30	26413,77	
609	26709,20	26533,21	
610	26746,40	26734,07	
611	26779,30	26813,27	
612	27021,50	26867,14	
613	27033,40	27042,92	
614	26597,80	27099,00	
615	26811,40	26890,79	
616	27135,90	26975,20	
617	26957,30	27118,84	
618	27616,90	27060,27	
619	27702,30	27514,01	
620	27377,60	27672,21	
621	27781,40	27600,22	
622	27689,50	27875,84	
623	27842,40	27829,49	
624	27808,10	27950,89	
625	27689,20	27979,53	
626	28061,90	27921,74	
627	28500,90	28135,50	
628	28427,30	28433,75	
629	28402,70	28520,79	
630	28675,40	28619,13	
631	28713,50	28809,38	
632	28992,10	28862,34	
633	29188,10	29087,29	
634	29273,30	29286,17	
635	28730,70	29426,60	
636	29164,80	29177,16	
637	29343,00	29388,00	
638	29615,30	29468,68	
639	29776,70	29691,09	
640	29543,50	29912,75	
641	29727,10	29866,86	
642	30123,60	29998,99	
643	29945,40	30238,81	
644	29924,80	30204,91	

Result			
No	d _t	y _t	
645	29701,00	30259,86	
646	29683,20	30125,43	
647	29111,80	30055,75	
648	28175,90	29660,87	
649	28074,90	28978,18	
650	28257,70	28654,48	
651	27906,30	28507,64	
652	28000,00	28211,37	
653	28456,90	28240,34	
654	28951,40	28482,75	
655	29191,60	28838,54	
656	29372,20	29164,30	
657	29814,20	29456,01	
658	30020,40	29848,85	
659	30015,10	30102,26	
660	30908,00	30234,14	
661	31948,00	30858,25	
662	31701,60	31652,04	
663	31879,50	31832,77	
664	31832,50	32189,41	
665	31385,00	32238,99	
666	31485,40	31965,81	
667	32202,70	31964,43	
668	32711,10	32324,54	
669	32541,10	32721,77	
670	32632,40	32842,47	
671	33271,10	33036,64	
672	33294,30	33451,20	
673	33221,20	33561,94	
674	33719,30	33648,71	
675	33863,80	34001,70	
676	33465,60	34151,09	
677	33250,50	34016,66	
678	33516,00	33900,31	
679	33319,20	33965,90	
680	32745,00	33809,78	
681	33396,20	33462,95	
682	33333,20	33757,08	
683	34300,90	33693,73	
684	35624,80	34336,24	
685	34775,70	35327,42	
686	33510,40	35177,22	
687	33413,60	34626,43	
688	33506,00	34343,35	

Result			
No	d _t	y _t	
689	34040,20	34070,84	
690	33118,40	34273,17	
691	32054,30	33806,69	
692	31440,00	33136,55	
693	31850,70	32480,79	
694	31586,80	32343,43	
695	30766,70	32032,52	
696	31403,90	31515,38	
697	31428,60	31764,96	
698	31845,70	31700,39	
699	31670,00	32000,26	
700	31474,40	32027,39	
701	31273,30	31962,52	
702	31038,50	31816,46	
703	31964,00	31586,90	
704	32792,00	32053,08	
705	33152,10	32639,63	
706	33830,10	33139,42	
707	33749,40	33849,53	
708	33848,30	34044,60	
709	34709,70	34248,74	
710	34096,30	34826,50	
711	34171,50	34592,57	
712	34324,00	34715,34	
713	34866,60	34782,72	
714	35127,30	35087,11	
715	35314,30	35358,30	
716	35655,00	35620,16	
717	35254,10	35945,18	
718	36179,30	35809,79	
719	36907,80	36378,45	
720	36759,90	36899,65	
721	36621,50	37040,93	
722	37495,20	37146,87	
723	38088,70	37672,91	
724	38296,90	38101,06	
725	38573,70	38439,06	
726	39130,70	38798,32	
727	38917,80	39234,73	
728	38441,60	39245,20	
729	38587,80	39059,23	
730	37496,20	39088,81	
731	38202,20	38380,57	
732	37741,70	38629,98	

Result			
No	d _t	y _t	
733	37870,60	38286,10	
734	37631,60	38331,96	
735	37716,70	38191,09	
736	37960,10	38192,70	
737	37729,40	38315,45	
738	38210,20	38209,16	
739	38353,10	38505,82	
740	38919,50	38632,72	
741	39139,10	39039,78	
742	39015,90	39301,14	
743	39220,20	39363,55	
744	39837,30	39544,52	
745	39777,70	39915,54	
746	39790,70	39982,38	
747	40665,40	40098,83	
748	41362,50	40626,64	
749	41722,40	41117,00	
750	41905,40	41535,89	
751	43628,80	41848,52	
752	44076,90	42895,67	
753	42622,90	43369,47	
754	43645,20	42911,80	
755	44465,70	43477,61	
756	43851,40	43827,31	
757	44434,50	43645,17	
758	45746,20	44070,08	
759	45784,10	44757,04	
760	45315,20	44945,49	
761	44891,30	44930,56	
762	44590,20	44758,25	
763	45250,70	44501,17	
764	44841,00	44715,94	
765	44228,00	44506,59	
766	44855,60	44229,63	
767	44653,00	44470,95	
768	43842,70	44319,35	
769	44117,50	43934,76	
770	44772,90	44005,74	
771	44046,30	44240,70	
772	43507,50	43921,89	
773	43804,00	43683,41	
774	45361,30	43717,97	
775	46244,30	44422,31	
776	46689,00	45030,93	

Result

No	d _t	y _t
777	46710,90	45563,81
778	46265,40	45823,14
779	46553,60	45716,44
780	46838,10	45843,26
781	47728,50	45948,08
782	47015,90	46411,53
783	47493,00	46200,39
784	46890,80	46497,78
785	46366,20	46208,88
786	45997,10	45926,53
787	43889,80	45648,78
788	42340,40	44460,16
789	42863,40	43373,75
790	42521,90	43149,73
791	44346,00	42664,10
792	42906,70	43563,58
793	43236,70	42986,96
794	44051,30	43260,29
795	44688,10	43628,01
796	44426,30	43996,65
797	44399,40	44064,12
798	44328,80	44166,89
799	44531,20	44129,75
800	43273,90	44204,86
801	42710,50	43564,00
802	41742,10	43165,39
803	42507,00	42418,21
804	42941,70	42548,20
805	42911,30	42684,58
806	44028,40	42766,59
807	44070,90	43469,22
808	44088,60	43632,39
809	43710,60	43805,21
810	44284,20	43688,92
811	43099,30	43949,98
812	42890,30	43338,95
813	42505,00	43165,70
814	41919,30	42802,68
815	42212,00	42336,77
816	41860,70	42356,80
817	42864,90	42086,21
818	43732,50	42590,57
819	43872,80	43130,26
820	45075,90	43420,88

Result

No	d _t	y _t
821	45278,40	44248,71
822	45352,50	44544,49
823	44745,50	44776,62
824	43752,00	44578,65
825	43880,40	44034,99
826	44030,40	43917,74
827	44413,60	43827,73
828	44647,80	43996,87
829	44251,40	44186,58
830	44212,80	44070,93
831	44712,90	44069,14
832	44563,30	44278,45
833	43599,00	44221,74
834	43713,20	43779,59
835	41970,80	43751,16
836	40268,70	42697,36
837	41044,10	41542,15
838	40439,20	41502,22
839	39643,70	40876,38
840	36351,10	40361,58
841	37235,50	38348,51
842	36100,70	38240,25
843	36730,20	37081,50
844	38593,50	37174,93
845	38908,60	38231,93
846	37860,80	38683,38
847	38132,20	38486,48
848	38395,20	38712,48
849	39285,80	38744,42
850	37964,00	39250,51
851	37464,40	38669,98
852	36709,60	38384,76
853	35338,70	37725,46
854	34802,60	36619,99
855	34330,30	35935,63
856	32384,40	35267,46
857	32899,70	33811,14
858	33627,40	33695,24
859	34048,00	33814,21
860	34807,70	34097,59
861	34601,40	34806,65
862	33762,00	34938,44
863	34229,00	34579,36
864	33132,30	34765,00

Result

No	d _t	y _t
865	31950,60	33999,16
866	32470,40	33131,77
867	33207,10	33102,69
868	34031,10	33306,73
869	35453,30	33908,03
870	35456,50	35078,81
871	36481,20	35506,06
872	35385,00	36447,56
873	35698,70	36060,37
874	36202,20	36273,83
875	36148,40	36508,12
876	35955,80	36506,13
877	35815,50	36502,14
878	35010,50	36425,52
879	33831,70	35887,04
880	32702,90	35025,66
881	33618,00	34016,92
882	33554,40	34102,80
883	35311,00	33893,17
884	34988,80	35009,03
885	34959,00	35151,33
886	35264,40	35402,26
887	35984,50	35677,93
888	36747,30	36113,36
889	36101,90	36720,31
890	36067,90	36597,00
891	35742,80	36685,03
892	35721,60	36436,93
893	35262,90	36314,49
894	36159,60	35978,32
895	35967,50	36412,17
896	36535,70	36344,34
897	37563,30	36774,21
898	37389,30	37502,02
899	37418,10	37621,89
900	37631,10	37841,58
901	37806,50	38023,00
902	38433,40	38141,94
903	37885,30	38566,63
904	37384,80	38378,36
905	37164,90	38137,14
906	37130,80	37898,82

Test Result

No	d _t	y _t
1	51643,80	49433,18
2	51112,00	49453,99
3	53325,30	49192,05
4	52935,80	50036,68
5	55625,40	49956,80
6	54930,70	51188,11
7	54831,90	51113,56
8	52512,40	51284,31
9	51561,90	50422,04
10	51459,20	49872,92
11	52824,90	49522,11
12	51299,30	49876,75
13	51393,60	49284,14
14	50716,40	49373,07
15	50429,90	48987,97
16	50708,20	48761,95
17	52070,60	48789,79
18	49974,80	49322,74
19	49186,40	48536,75
20	50272,50	48220,72
21	49880,90	48456,43
22	47714,10	48177,81
23	44473,30	47262,48
24	46576,90	45565,88
25	46148,80	45973,03
26	45265,00	45426,66
27	46882,00	45046,52
28	47388,60	45826,28
29	46824,00	46078,81
30	47914,40	46012,04
31	47750,70	46639,81
32	48082,20	46609,64
33	50198,60	46858,61
34	49936,90	47886,35
35	50032,60	47961,68
36	49421,40	48251,66
37	49601,40	48060,39
38	49050,40	48092,14
39	48548,90	47792,05
40	49296,20	47515,09
41	49233,10	47755,62
42	49680,50	47698,24
43	50620,90	47958,96
44	50536,50	48435,63

Result			
No	d_t	y_t	
45	50500,90	48514,35	
46	53884,10	48621,81	
47	53543,10	50057,10	
48	53882,10	50123,36	
49	53580,70	50584,84	
50	52893,20	50586,36	
51	54245,80	50318,14	
52	54390,20	50787,93	
53	54044,20	50840,53	
54	54198,00	50821,86	
55	54733,30	50928,38	
56	54164,90	51111,09	
57	54915,90	50925,15	
58	56793,00	51236,97	
59	56279,10	51928,53	
60	57910,60	51881,74	
61	57418,00	52623,95	
62	58053,40	52539,19	
63	58231,90	52856,79	
64	57185,40	52950,15	
65	57931,90	52641,07	
66	56268,20	52884,81	
67	55486,80	52262,45	
68	53969,80	51944,76	
69	55752,20	51225,88	
70	55638,90	51672,59	
71	55728,60	51557,62	
72	56446,60	51697,83	
73	56774,30	52012,66	
74	57615,70	52166,32	
75	57371,30	52539,85	
76	56855,10	52542,13	
77	56064,30	52435,76	
78	56906,00	52142,28	
79	56076,40	52347,63	
80	55160,80	52007,78	
81	53689,10	51688,95	
82	54084,00	51050,28	
83	54719,00	51003,16	
84	55664,90	51090,57	
85	54743,00	51463,83	
86	54304,50	51242,21	
87	53262,90	51144,94	
88	53577,80	50669,11	

Result			
No	d_t	y_t	
89	52615,60	50654,22	
90	52199,30	50172,58	
91	52331,30	49939,77	
92	52682,50	49880,40	
93	51452,30	49948,02	
94	53202,80	49462,54	
95	53181,20	50140,33	
96	54213,80	50126,67	
97	54320,00	50662,65	
98	54013,30	50827,36	
99	55521,20	50815,05	
100	56186,90	51416,08	
101	56490,60	51712,65	
102	56518,60	51981,01	
103	56271,30	52115,52	
104	56766,20	52077,42	
105	55239,00	52252,62	
106	54911,70	51707,36	
107	53603,40	51552,41	
108	54223,60	50919,74	
109	53847,40	50997,51	
110	55510,50	50748,95	
111	55380,70	51370,51	
112	55373,20	51395,95	
113	55233,00	51529,51	
114	55698,40	51524,63	
115	55538,10	51682,23	
116	54708,40	51633,13	
117	53541,30	51357,14	
118	52529,90	50876,02	
119	52569,50	50330,87	
120	53235,90	50135,70	
121	52730,70	50253,83	
122	52351,00	50056,34	
123	51920,60	49945,26	
124	51480,90	49722,15	
125	50377,30	49452,28	
126	49093,80	48896,47	
127	48902,80	48195,86	
128	48657,50	47867,17	
129	45544,10	47536,48	
130	44593,70	45968,54	
131	42539,50	45194,79	
132	45010,70	43622,09	

Result			
No	d _t	y _t	
133	45497,20	44340,36	
134	43706,70	44506,12	
135	44572,70	43854,72	
136	44304,40	44353,96	
137	42697,60	44081,17	
138	44452,10	43227,91	
139	45719,90	43986,64	
140	44350,80	44571,82	
141	43317,50	44141,95	
142	41866,40	43774,24	
143	41957,90	42789,54	
144	41342,80	42431,69	
145	43539,90	41821,86	
146	44752,50	42843,18	
147	45493,70	43642,19	

Result			
No	d _t	y _t	
148	44305,30	44424,81	
149	45741,70	44200,35	
150	46249,30	44987,47	
151	45876,70	45257,63	
152	46446,60	45242,74	
153	45592,50	45642,81	
154	44895,00	45253,11	
155	45524,50	44882,14	
156	46260,30	45045,07	
157	45823,30	45324,51	
158	44776,90	45221,49	
159	43343,60	44798,40	
160	42923,00	43954,15	

APPENDIX_H

GARCH-LTS RESULTS FOR TRAINING AND TEST

Training			Result		
Result					
No	d_t	y_t	No	d_t	y_t
1	10225,80	42607,68	36	10841,80	12261,39
2	10204,10	39758,70	37	10961,30	12153,63
3	10412,70	26429,75	38	10817,50	13139,75
4	10124,90	15242,27	39	10744,70	11171,03
5	10280,70	11542,15	40	10614,10	12206,16
6	10467,90	11252,96	41	10666,60	12320,88
7	10348,30	11383,86	42	10604,30	12326,00
8	10590,30	11496,12	43	9482,92	12305,92
9	10570,40	11606,11	44	10581,50	12208,83
10	10544,70	11650,32	45	9938,21	11916,91
11	10881,90	11800,36	46	9644,31	11835,44
12	10825,90	11879,95	47	9406,56	11846,71
13	10931,10	11971,69	48	8892,65	12368,61
14	10742,90	12023,27	49	9187,88	11408,86
15	10725,70	12113,77	50	9408,46	11183,40
16	10945,70	12190,43	51	9572,25	11521,81
17	11032,00	12127,26	52	9631,43	11707,79
18	11122,00	12226,79	53	9475,09	11861,77
19	10658,30	12287,88	54	9773,83	11638,25
20	10659,90	12269,41	55	9804,88	11815,04
21	10921,80	12274,50	56	10153,20	11858,30
22	11013,80	12268,97	57	10415,00	11918,60
23	11302,50	12286,64	58	10743,00	11981,86
24	11775,50	12422,24	59	10512,90	12076,48
25	11607,30	12247,74	60	10886,20	12060,33
26	11669,30	12507,74	61	10629,70	12253,32
27	11754,00	12536,75	62	10565,90	12175,19
28	11392,60	12670,67	63	11103,40	12256,27
29	11272,70	12698,10	64	11169,00	12251,74
30	11291,90	12503,16	65	11366,00	12304,40
31	11486,80	12591,86	66	11219,20	12335,28
32	11574,40	12591,44	67	11254,00	12388,12
33	10128,90	12635,77	68	11504,70	12604,51
34	10616,10	12436,38	69	11405,20	12346,13
35	10815,50	12033,84	70	11119,60	12573,64

Result			
No	d_t	y_t	
71	11341,40	12552,37	
72	11311,10	12526,87	
73	11436,20	12573,57	
74	11510,00	12526,28	
75	11467,60	12598,19	
76	11300,70	12551,55	
77	11112,10	12579,44	
78	10962,90	12587,98	
79	10676,30	12535,47	
80	10783,90	12476,60	
81	10640,40	12410,73	
82	10712,90	12355,47	
83	10590,70	12303,94	
84	10393,30	12320,28	
85	10229,40	12215,19	
86	10306,30	12236,86	
87	10427,00	12180,36	
88	10540,90	12183,41	
89	10695,20	12178,91	
90	11056,30	12178,25	
91	11125,30	12227,90	
92	11088,90	12302,21	
93	11437,40	12373,10	
94	11407,10	12440,85	
95	11381,40	12520,13	
96	11579,30	12458,55	
97	11346,50	12578,97	
98	11084,70	12641,68	
99	11129,70	12505,79	
100	10973,40	12544,67	
101	10827,80	12528,19	
102	10644,70	12461,38	
103	10597,30	12395,54	
104	10489,20	12304,49	
105	10713,90	12324,07	
106	11036,70	12272,08	
107	11169,20	12286,05	
108	11107,50	12293,58	
109	10902,50	12384,33	
110	10783,90	12420,47	
111	10747,50	12418,93	
112	10756,80	12338,06	
113	10740,20	12363,59	
114	10927,80	12359,35	

Result			
No	d_t	y_t	
115	10981,20	12315,06	
116	10884,40	12340,14	
117	10749,80	12369,41	
118	10690,90	12371,50	
119	10726,60	12371,31	
120	10502,90	12326,53	
121	10351,80	12321,39	
122	10546,90	12266,80	
123	10364,90	12230,73	
124	10399,70	12214,06	
125	10454,90	12217,10	
126	10658,80	12164,72	
127	10918,60	12200,58	
128	10791,40	12229,00	
129	10751,50	12241,19	
130	10856,90	12305,13	
131	10827,30	12345,07	
132	10544,50	12344,76	
133	10463,80	12303,05	
134	10475,20	12278,75	
135	10561,30	12275,49	
136	10598,30	12244,88	
137	10478,30	12272,08	
138	10445,00	12177,82	
139	10572,00	12224,02	
140	10621,20	12236,23	
141	11112,10	12233,79	
142	11499,90	12280,43	
143	11311,10	12295,16	
144	11547,40	12403,87	
145	11558,50	12476,10	
146	11762,30	12652,95	
147	11860,10	12516,93	
148	11916,10	12599,54	
149	11794,90	12724,77	
150	11877,50	12736,25	
151	11661,20	12804,46	
152	11688,90	12771,64	
153	11557,00	12763,41	
154	11845,90	12754,36	
155	12001,10	12722,27	
156	11798,00	12758,52	
157	11735,20	12730,02	
158	11623,40	12777,64	

Result			
No	d _t	y _t	
159	11509,00	12785,93	
160	11611,80	12703,20	
161	11652,80	12720,92	
162	11637,10	12670,51	
163	11671,80	12697,62	
164	11636,50	12694,91	
165	11631,80	12699,03	
166	11581,30	12706,60	
167	11946,70	12707,67	
168	12317,70	12722,14	
169	12507,00	12756,34	
170	12715,20	12833,36	
171	12662,50	12950,50	
172	13005,00	13095,72	
173	12958,20	13117,53	
174	13419,30	13146,92	
175	13663,50	13318,78	
176	13845,00	13374,85	
177	14031,10	13578,70	
178	13798,30	13596,90	
179	13935,70	13841,40	
180	13758,80	13716,75	
181	13255,90	13837,08	
182	13055,90	13798,24	
183	13444,00	13667,70	
184	13880,50	13583,87	
185	14210,20	13588,80	
186	15719,70	13714,71	
187	15482,70	13727,03	
188	15147,80	13908,01	
189	14907,00	14364,24	
190	15420,60	14386,82	
191	15064,80	15372,82	
192	15023,00	13449,66	
193	15382,20	14650,31	
194	15596,80	14607,44	
195	15381,90	14750,62	
196	15358,70	14675,92	
197	15595,30	14719,93	
198	15300,40	14902,89	
199	14829,50	14814,12	
200	14866,30	14790,56	
201	14564,80	14641,78	
202	14673,40	14606,14	

Result			
No	d _t	y _t	
203	15379,70	14463,73	
204	15754,30	14486,19	
205	16341,20	14353,20	
206	16268,30	14784,46	
207	16408,30	14880,92	
208	15536,80	15402,82	
209	15708,10	15050,06	
210	15528,60	15203,51	
211	15224,10	15002,02	
212	15771,40	15014,82	
213	16056,60	15184,19	
214	16080,70	14517,43	
215	15687,10	15062,75	
216	15760,50	15126,67	
217	15780,20	15160,78	
218	14617,50	15021,66	
219	16007,60	14986,10	
220	16242,00	14772,91	
221	16389,60	14563,38	
222	16271,90	14964,14	
223	16504,80	15597,91	
224	16913,30	15100,35	
225	16861,00	14432,13	
226	16614,70	15680,49	
227	16551,60	15775,88	
228	16955,20	15796,65	
229	17410,00	15867,86	
230	17208,50	15825,65	
231	17230,80	16019,00	
232	17742,40	16067,33	
233	18206,10	16308,40	
234	18387,60	16405,38	
235	18242,00	16560,74	
236	18239,90	16838,95	
237	17643,70	17114,14	
238	17996,80	16981,23	
239	17973,90	16852,37	
240	18292,90	16919,47	
241	18625,00	16903,85	
242	19147,70	17123,43	
243	19696,60	17035,48	
244	19013,80	17469,16	
245	19382,80	17806,82	
246	19404,90	17903,75	

Result			
No	d_t	y_t	
247	19926,50	18130,85	
248	19558,80	18200,75	
249	19460,30	18324,65	
250	18818,60	18148,65	
251	18952,20	18272,81	
252	18301,20	18202,43	
253	17788,60	17854,62	
254	18832,80	17449,60	
255	18899,90	17479,75	
256	18518,10	16991,30	
257	18356,50	17491,04	
258	17899,50	17165,70	
259	17902,00	17498,72	
260	17282,30	16615,97	
261	17259,30	17024,28	
262	17033,80	16581,37	
263	16965,80	16544,01	
264	17641,00	16172,32	
265	17418,50	16380,02	
266	18000,30	15988,99	
267	18885,90	16395,21	
268	19000,50	16562,13	
269	19324,50	17038,20	
270	19010,10	17099,41	
271	19478,70	17698,53	
272	18606,00	17943,94	
273	18603,80	17519,40	
274	18284,00	17786,11	
275	18497,70	17668,57	
276	18707,10	17489,71	
277	18771,60	17569,21	
278	18889,20	17017,54	
279	18786,40	17561,05	
280	19356,60	17544,57	
281	19171,90	17726,50	
282	19015,50	17798,53	
283	19165,70	17914,24	
284	19495,40	17954,22	
285	19488,50	18133,43	
286	19798,80	17972,84	
287	19381,40	18241,19	
288	19364,40	18321,94	
289	19526,50	18369,98	
290	19321,60	18324,37	

Result			
No	d_t	y_t	
291	19294,50	18362,26	
292	19611,10	18291,32	
293	20023,80	18179,06	
294	20167,20	18385,26	
295	20185,80	18538,33	
296	20347,80	18702,36	
297	20472,60	18957,35	
298	20836,10	19110,73	
299	20887,00	19215,97	
300	20030,70	19452,84	
301	20190,80	19509,02	
302	20322,20	19316,29	
303	20485,00	19365,98	
304	20330,90	19202,39	
305	20272,90	19459,23	
306	20040,10	18836,59	
307	19419,80	19223,90	
308	19505,20	19054,20	
309	19259,50	18779,31	
310	19104,40	18582,83	
311	18678,20	18366,31	
312	18687,50	18212,54	
313	19269,50	17690,13	
314	19935,70	17875,40	
315	19528,10	17875,77	
316	19270,40	18093,14	
317	19431,50	18064,19	
318	18586,50	18384,98	
319	18217,10	18160,01	
320	18229,70	17677,67	
321	17737,90	17544,43	
322	18022,70	17290,18	
323	17678,30	17266,37	
324	18244,70	16586,76	
325	18272,40	16780,73	
326	17624,10	16957,15	
327	17002,00	16776,09	
328	16807,70	16708,26	
329	17102,50	16502,80	
330	17144,70	16167,57	
331	16645,90	16292,99	
332	16531,30	15949,55	
333	15922,40	15712,95	
334	16124,30	15811,15	

Result			
No	d _t	y _t	
335	16334,20	15536,04	
336	16628,80	15589,19	
337	17167,40	15333,18	
338	16791,10	15705,40	
339	17235,50	15469,23	
340	17164,00	15860,60	
341	17327,90	15995,48	
342	17081,10	16166,59	
343	16766,80	16065,88	
344	16867,50	16113,78	
345	17044,40	15990,54	
346	17708,20	16061,28	
347	18020,30	16120,13	
348	17604,10	16210,30	
349	17615,60	16355,99	
350	17786,40	16522,52	
351	17664,50	16762,73	
352	17079,80	16452,09	
353	17230,50	16595,33	
354	17099,00	16314,04	
355	16901,40	16373,74	
356	16964,10	16223,98	
357	16785,40	16230,34	
358	16752,80	15866,51	
359	16820,00	15993,41	
360	16888,60	15950,10	
361	17355,20	15904,87	
362	17710,40	15998,49	
363	17735,50	16072,48	
364	17967,60	16279,78	
365	18290,30	16480,83	
366	18416,40	16760,36	
367	18554,80	16811,26	
368	18237,60	17018,24	
369	18296,70	17207,27	
370	18076,90	17233,63	
371	18327,10	17176,79	
372	18368,40	17177,88	
373	18493,00	17197,15	
374	18635,20	17139,23	
375	18966,20	17294,84	
376	19157,30	17390,93	
377	18945,00	17538,89	
378	18881,30	17713,48	

Result			
No	d _t	y _t	
379	18779,80	17781,36	
380	18628,70	17831,34	
381	18904,30	17713,39	
382	18645,40	17708,07	
383	18774,60	17625,89	
384	19018,60	17624,00	
385	19111,40	17661,14	
386	19380,90	17733,35	
387	19698,10	17842,45	
388	19427,40	17981,41	
389	19048,50	18189,58	
390	19344,30	18191,25	
391	19187,60	18222,19	
392	19248,10	18176,23	
393	19392,60	18109,16	
394	18908,60	18126,42	
395	18775,50	18031,42	
396	18826,00	17945,12	
397	18832,20	17881,74	
398	19459,70	17811,45	
399	19268,10	17892,65	
400	19187,80	17720,70	
401	19286,30	17967,64	
402	19363,70	18055,58	
403	19663,60	18249,55	
404	19558,00	18028,59	
405	19572,30	18259,21	
406	19855,30	18357,06	
407	20218,40	18457,62	
408	20512,20	18624,74	
409	20525,90	18759,55	
410	20775,00	19007,26	
411	20851,60	19283,74	
412	21119,20	19474,61	
413	21468,30	19643,52	
414	21398,00	19859,58	
415	21004,10	20118,59	
416	21060,20	20188,50	
417	21705,30	20226,63	
418	21616,50	20308,75	
419	21704,80	20293,34	
420	20833,20	20539,22	
421	20373,40	20389,56	
422	21192,90	20306,44	

Result

No	d _t	y _t
423	21491,40	19896,44
424	22276,70	19952,98
425	22307,40	20430,50
426	22083,00	20132,64
427	22293,80	21002,74
428	22219,90	20879,17
429	21953,50	21518,73
430	21722,50	21106,43
431	21987,70	21297,47
432	21612,50	21171,21
433	22287,10	21062,57
434	22432,20	21052,33
435	22951,40	21081,48
436	22787,30	21384,00
437	22289,90	21656,63
438	22630,00	21859,49
439	22318,90	21655,68
440	22477,10	21923,72
441	22334,30	21667,39
442	22550,90	21764,84
443	22220,80	21593,81
444	22201,50	21660,89
445	22244,00	21551,27
446	21907,80	21565,37
447	22142,50	21458,26
448	22565,80	21374,18
449	22899,90	21331,99
450	22857,90	21538,24
451	23215,60	21785,63
452	23437,80	21969,64
453	23006,50	22346,94
454	23215,60	22455,59
455	22616,00	22526,00
456	22544,30	22572,34
457	22618,00	22286,63
458	22186,90	22220,94
459	22104,70	21875,09
460	22566,40	21809,41
461	23132,60	21460,77
462	23176,70	21720,50
463	22931,40	21968,44
464	23472,40	22037,41
465	23516,30	22440,04
466	23464,50	22602,12

Result

No	d _t	y _t
467	23293,20	22655,09
468	22799,20	22880,12
469	22486,20	22843,50
470	22560,90	22444,33
471	23150,10	22317,22
472	23008,10	22203,03
473	23049,50	22193,68
474	23075,60	22137,08
475	22625,40	22295,59
476	22679,90	22467,23
477	22943,70	22124,57
478	23634,80	22222,15
479	23417,90	22327,95
480	23289,70	22511,73
481	23935,20	22535,69
482	24360,60	22905,73
483	24341,40	23266,75
484	24044,60	23293,13
485	24525,30	23676,95
486	24430,80	24004,33
487	24537,70	23932,39
488	24590,80	24109,55
489	24935,80	24287,62
490	24971,70	24430,76
491	25445,20	24502,82
492	25042,00	24827,70
493	24422,90	24997,00
494	24561,90	25013,22
495	25308,30	24785,88
496	25604,70	24897,77
497	26110,20	24861,64
498	26271,30	25270,04
499	26493,00	25497,08
500	26362,70	26317,40
501	26863,20	26333,59
502	26813,10	26863,80
503	26918,10	26970,31
504	26469,40	27258,93
505	26860,00	27305,49
506	27056,00	27378,62
507	27302,70	27340,98
508	27074,10	27549,43
509	27330,40	27711,88
510	27849,80	27757,49

Result			
No	d _t	y _t	
511	27936,50	28015,79	
512	27554,80	28292,63	
513	27813,20	28462,79	
514	28201,70	28565,17	
515	28269,70	28799,92	
516	27528,10	28841,03	
517	27308,80	28970,91	
518	27736,30	28720,78	
519	28003,60	28722,90	
520	28164,10	28611,09	
521	27661,60	28822,43	
522	27000,40	28575,44	
523	27293,20	28677,60	
524	26864,30	28430,46	
525	26657,40	28215,79	
526	26921,30	27919,28	
527	27354,60	27653,63	
528	28031,50	27492,52	
529	28396,20	27881,42	
530	27768,50	28170,10	
531	27226,40	28599,72	
532	27558,90	28694,21	
533	27663,20	28684,84	
534	27789,90	28467,86	
535	27698,30	28564,15	
536	27746,40	28432,65	
537	27519,80	28499,25	
538	27572,80	28594,17	
539	26936,80	28582,92	
540	26547,20	28424,49	
541	25331,70	28071,16	
542	24476,00	27546,42	
543	25348,50	26524,14	
544	24636,70	25985,95	
545	25218,20	25159,58	
546	24439,30	25242,26	
547	25068,50	24357,13	
548	25502,60	24578,62	
549	24842,20	24718,37	
550	24479,70	24807,64	
551	24600,90	24895,73	
552	25557,80	24608,65	
553	25740,80	24766,06	
554	25445,10	25003,60	

Result			
No	d _t	y _t	
555	25682,50	25083,37	
556	26056,60	25426,87	
557	25831,20	26021,49	
558	25786,50	25625,81	
559	25370,30	26077,44	
560	25078,00	26000,24	
561	25293,20	25863,39	
562	24542,00	25624,14	
563	23853,30	25337,32	
564	23285,90	24886,89	
565	24143,90	24214,45	
566	24175,90	23835,52	
567	24419,40	23731,39	
568	24730,80	23520,53	
569	24798,10	23714,57	
570	24484,00	24198,82	
571	24070,10	24069,74	
572	23519,60	24384,92	
573	23591,60	24140,49	
574	24253,00	23762,37	
575	24137,90	23669,59	
576	24560,20	23536,79	
577	25099,90	23705,38	
578	24950,80	23866,24	
579	24702,20	24490,07	
580	24688,30	24435,99	
581	24662,90	24743,10	
582	25114,40	24736,97	
583	25325,70	24656,95	
584	24921,30	24855,50	
585	24846,10	24929,50	
586	25205,50	24983,59	
587	25464,90	25110,31	
588	24329,10	25087,60	
589	24140,90	25092,53	
590	24119,80	24582,25	
591	24054,10	24538,27	
592	24453,10	24163,53	
593	24977,80	24321,92	
594	25236,50	23521,19	
595	25230,80	24358,61	
596	25799,10	24714,88	
597	26051,60	25142,44	
598	25533,10	25504,97	

Result			
No	d_t	y_t	
599	25478,00	25681,74	
600	25779,80	25805,59	
601	25500,00	25989,86	
602	25725,20	25782,64	
603	25610,00	25894,82	
604	25929,90	25725,82	
605	26209,40	25939,72	
606	26579,70	26050,89	
607	26529,30	26275,83	
608	26709,20	26558,11	
609	26746,40	26851,16	
610	26779,30	27045,62	
611	27021,50	27226,40	
612	27033,40	27316,64	
613	26597,80	27488,39	
614	26811,40	27508,78	
615	27135,90	27479,75	
616	26957,30	27551,01	
617	27616,90	27549,96	
618	27702,30	27754,62	
619	27377,60	27859,70	
620	27781,40	28172,37	
621	27689,50	28292,33	
622	27842,40	28531,82	
623	27808,10	28440,36	
624	27689,20	28670,23	
625	28061,90	28679,25	
626	28500,90	28725,89	
627	28427,30	28930,70	
628	28402,70	29124,17	
629	28675,40	29316,43	
630	28713,50	29527,14	
631	28992,10	29676,45	
632	29188,10	29791,53	
633	29273,30	30024,09	
634	28730,70	30252,85	
635	29164,80	30310,69	
636	29343,00	30363,51	
637	29615,30	30427,05	
638	29776,70	30554,28	
639	29543,50	30786,38	
640	29727,10	30839,16	
641	30123,60	31008,77	
642	29945,40	31217,00	

Result			
No	d_t	y_t	
643	29924,80	31314,93	
644	29701,00	31412,14	
645	29683,20	31414,01	
646	29111,80	31412,91	
647	28175,90	31198,97	
648	28074,90	30790,90	
649	28257,70	30260,04	
650	27906,30	29852,70	
651	28000,00	29529,71	
652	28456,90	29246,80	
653	28951,40	28877,67	
654	29191,60	29353,31	
655	29372,20	29659,84	
656	29814,20	29960,02	
657	30020,40	30461,71	
658	30015,10	30802,21	
659	30908,00	31084,34	
660	31948,00	31501,99	
661	31701,60	32040,23	
662	31879,50	32499,77	
663	31832,50	33027,85	
664	31385,00	33498,54	
665	31485,40	33505,17	
666	32202,70	33286,87	
667	32711,10	33538,57	
668	32541,10	33705,50	
669	32632,40	33970,37	
670	33271,10	34138,29	
671	33294,30	34546,88	
672	33221,20	34667,17	
673	33719,30	34882,10	
674	33863,80	35101,63	
675	33465,60	35358,67	
676	33250,50	35377,82	
677	33516,00	35440,24	
678	33319,20	35461,61	
679	32745,00	35361,34	
680	33396,20	35261,32	
681	33333,20	35117,89	
682	34300,90	35133,38	
683	35624,80	35280,95	
684	34775,70	35678,06	
685	33510,40	36016,95	
686	33413,60	36140,99	

Result

No	d _t	y _t
687	33506,00	36152,47
688	34040,20	35948,29
689	33118,40	35541,24
690	32054,30	35553,98
691	31440,00	34914,02
692	31850,70	34758,92
693	31586,80	34365,75
694	30766,70	33968,73
695	31403,90	33440,58
696	31428,60	32992,74
697	31845,70	33072,62
698	31670,00	33169,65
699	31474,40	33335,23
700	31273,30	33245,89
701	31038,50	33299,39
702	31964,00	33299,55
703	32792,00	33236,33
704	33152,10	33430,61
705	33830,10	33826,98
706	33749,40	34379,81
707	33848,30	34977,53
708	34709,70	35229,58
709	34096,30	35567,94
710	34171,50	35896,52
711	34324,00	35920,66
712	34866,60	36073,64
713	35127,30	36261,85
714	35314,30	36277,64
715	35655,00	36485,59
716	35254,10	36794,69
717	36179,30	36984,16
718	36907,80	37113,24
719	36759,90	37384,46
720	36621,50	37660,77
721	37495,20	37861,30
722	38088,70	38125,26
723	38296,90	38293,57
724	38573,70	38556,98
725	39130,70	38846,79
726	38917,80	39152,60
727	38441,60	39276,16
728	38587,80	39382,30
729	37496,20	39419,46
730	38202,20	39333,69

Result

No	d _t	y _t
731	37741,70	39150,48
732	37870,60	39065,99
733	37631,60	38941,73
734	37716,70	38956,30
735	37960,10	38766,12
736	37729,40	38833,14
737	38210,20	38831,34
738	38353,10	38893,04
739	38919,50	38958,63
740	39139,10	39104,35
741	39015,90	39257,18
742	39220,20	39413,27
743	39837,30	39516,44
744	39777,70	39678,63
745	39790,70	39762,51
746	40665,40	39873,25
747	41362,50	40007,73
748	41722,40	40203,88
749	41905,40	40384,74
750	43628,80	40606,95
751	44076,90	40899,57
752	42622,90	41110,26
753	43645,20	41297,22
754	44465,70	41392,02
755	43851,40	41592,72
756	44434,50	41504,78
757	45746,20	41691,36
758	45784,10	41730,26
759	45315,20	41900,80
760	44891,30	42006,31
761	44590,20	42050,57
762	45250,70	42074,50
763	44841,00	41992,85
764	44228,00	42005,14
765	44855,60	41950,19
766	44653,00	41924,72
767	43842,70	41925,17
768	44117,50	41869,47
769	44772,90	41821,02
770	44046,30	41814,84
771	43507,50	41794,89
772	43804,00	41763,56
773	45361,30	41696,08
774	46244,30	41763,66

Result			
No	d _t	y _t	
775	46689,00	41846,10	
776	46710,90	42002,33	
777	46265,40	42170,34	
778	46553,60	42324,28	
779	46838,10	42309,19	
780	47728,50	42371,88	
781	47015,90	42424,41	
782	47493,00	42461,85	
783	46890,80	42494,12	
784	46366,20	42519,19	
785	45997,10	42505,80	
786	43889,80	42435,26	
787	42340,40	42305,30	
788	42863,40	42051,68	
789	42521,90	41785,87	
790	44346,00	41549,02	
791	42906,70	41521,53	
792	43236,70	41271,20	
793	44051,30	41320,74	
794	44688,10	41486,85	
795	44426,30	41648,59	
796	44399,40	41610,73	
797	44328,80	41681,03	
798	44531,20	41819,59	
799	43273,90	41826,84	
800	42710,50	41786,15	
801	41742,10	41672,51	
802	42507,00	41517,18	
803	42941,70	41345,91	
804	42911,30	41285,90	
805	44028,40	41167,89	
806	44070,90	41319,09	
807	44088,60	41412,41	
808	43710,60	41556,94	
809	44284,20	41632,33	
810	43099,30	41714,28	
811	42890,30	41639,01	
812	42505,00	41592,20	
813	41919,30	41504,03	
814	42212,00	41364,10	
815	41860,70	41253,71	
816	42864,90	41069,11	
817	43732,50	41106,61	
818	43872,80	41179,18	

Result			
No	d _t	y _t	
819	45075,90	41305,23	
820	45278,40	41517,17	
821	45352,50	41722,54	
822	44745,50	41864,20	
823	43752,00	41943,68	
824	43880,40	41977,44	
825	44030,40	41846,35	
826	44413,60	41812,94	
827	44647,80	41768,79	
828	44251,40	41767,72	
829	44212,80	41754,64	
830	44712,90	41805,81	
831	44563,30	41832,69	
832	43599,00	41844,20	
833	43713,20	41819,28	
834	41970,80	41754,27	
835	40268,70	41650,65	
836	41044,10	41341,77	
837	40439,20	41063,98	
838	39643,70	40741,12	
839	36351,10	40581,09	
840	37235,50	39954,42	
841	36100,70	39127,33	
842	36730,20	38930,83	
843	38593,50	38366,56	
844	38908,60	38813,99	
845	37860,80	37362,52	
846	38132,20	38809,85	
847	38395,20	38826,17	
848	39285,80	39255,86	
849	37964,00	38953,13	
850	37464,40	39285,98	
851	36709,60	39036,31	
852	35338,70	38982,06	
853	34802,60	38617,34	
854	34330,30	38015,61	
855	32384,40	37242,39	
856	32899,70	36678,96	
857	33627,40	35841,22	
858	34048,00	35185,11	
859	34807,70	35244,36	
860	34601,40	35798,24	
861	33762,00	35134,73	
862	34229,00	36057,35	

Result		
No	d_t	y_t
863	33132,30	36024,76
864	31950,60	36011,49
865	32470,40	35420,05
866	33207,10	35066,15
867	34031,10	34681,67
868	35453,30	34903,82
869	35456,50	35160,57
870	36481,20	35582,44
871	35385,00	36591,17
872	35698,70	36970,81
873	36202,20	37288,25
874	36148,40	37152,36
875	35955,80	37567,99
876	35815,50	37509,55
877	35010,50	37405,64
878	33831,70	37488,46
879	32702,90	37114,65
880	33618,00	36548,04
881	33554,40	35995,05
882	35311,00	35667,78
883	34988,80	35656,28
884	34959,00	35681,98
885	35264,40	36102,01
886	35984,50	36433,79
887	36747,30	37116,68
888	36101,90	36786,67
889	36067,90	37417,98
890	35742,80	37598,88
891	35721,60	37689,89
892	35262,90	37597,86
893	36159,60	37440,30
894	35967,50	37339,71
895	36535,70	37402,11
896	37563,30	37492,22
897	37389,30	37772,14
898	37418,10	38061,27
899	37631,10	38222,81
900	37806,50	38505,30

Test Result		
No	d_t	y_t
1	51643,80	43158,73
2	51112,00	43183,18

Result		
No	d_t	y_t
3	53325,30	43245,20
4	52935,80	43230,13
5	55625,40	43331,15
6	54930,70	43392,45
7	54831,90	43472,00
8	52512,40	43437,90
9	51561,90	43445,98
10	51459,20	43320,50
11	52824,90	43307,68
12	51299,30	43283,18
13	51393,60	43184,22
14	50716,40	43197,16
15	50429,90	43179,48
16	50708,20	43130,60
17	52070,60	43109,74
18	49974,80	43123,10
19	49186,40	43067,93
20	50272,50	43051,61
21	49880,90	43033,41
22	47714,10	42960,17
23	44473,30	42711,09
24	46576,90	42568,35
25	46148,80	42413,58
26	45265,00	42327,32
27	46882,00	42258,98
28	47388,60	42097,57
29	46824,00	42281,71
30	47914,40	42445,18
31	47750,70	42531,34
32	48082,20	42543,59
33	50198,60	42682,28
34	49936,90	42780,84
35	50032,60	42863,12
36	49421,40	42930,29
37	49601,40	42988,98
38	49050,40	42897,33
39	48548,90	42909,62
40	49296,20	42884,69
41	49233,10	42864,13
42	49680,50	42880,22
43	50620,90	42915,53
44	50536,50	42972,28
45	50500,90	43013,02
46	53884,10	43112,08

Result

No	d_t	y_t
47	53543,10	43192,45
48	53882,10	43287,64
49	53580,70	43353,16
50	52893,20	43431,05
51	54245,80	43329,15
52	54390,20	43418,68
53	54044,20	43432,01
54	54198,00	43443,45
55	54733,30	43464,21
56	54164,90	43460,33
57	54915,90	43477,15
58	56793,00	43507,41
59	56279,10	43541,38
60	57910,60	43585,80
61	57418,00	43622,75
62	58053,40	43662,70
63	58231,90	43668,70
64	57185,40	43692,44
65	57931,90	43683,21
66	56268,20	43681,42
67	55486,80	43653,45
68	53969,80	43614,44
69	55752,20	43570,81
70	55638,90	43556,61
71	55728,60	43535,36
72	56446,60	43562,21
73	56774,30	43582,05
74	57615,70	43601,81
75	57371,30	43636,52
76	56855,10	43651,86
77	56064,30	43647,88
78	56906,00	43645,34
79	56076,40	43630,90
80	55160,80	43611,03
81	53689,10	43574,04
82	54084,00	43530,99
83	54719,00	43502,78
84	55664,90	43493,42
85	54743,00	43499,65
86	54304,50	43489,85
87	53262,90	43491,44
88	53577,80	43466,29
89	52615,60	43426,52
90	52199,30	43374,90

Result

No	d_t	y_t
91	52331,30	43345,26
92	52682,50	43312,95
93	51452,30	43297,03
94	53202,80	43278,70
95	53181,20	43299,46
96	54213,80	43340,08
97	54320,00	43383,71
98	54013,30	43417,65
99	55521,20	43438,96
100	56186,90	43500,29
101	56490,60	43534,56
102	56518,60	43573,10
103	56271,30	43602,84
104	56766,20	43606,72
105	55239,00	43609,57
106	54911,70	43589,09
107	53603,40	43556,12
108	54223,60	43515,58
109	53847,40	43487,03
110	55510,50	43460,13
111	55380,70	43488,71
112	55373,20	43501,02
113	55233,00	43526,98
114	55698,40	43551,55
115	55538,10	43541,75
116	54708,40	43548,95
117	53541,30	43526,02
118	52529,90	43482,75
119	52569,50	43427,73
120	53235,90	43388,32
121	52730,70	43354,93
122	52351,00	43327,86
123	51920,60	43308,15
124	51480,90	43292,77
125	50377,30	43239,18
126	49093,80	43155,70
127	48902,80	43059,90
128	48657,50	42967,36
129	45544,10	42821,78
130	44593,70	42550,50
131	42539,50	42265,70
132	45010,70	42005,91
133	45497,20	41993,84
134	43706,70	41538,26

Result			
No	d _t	y _t	
135	44572,70	41821,10	
136	44304,40	41797,12	
137	42697,60	41577,91	
138	44452,10	41730,25	
139	45719,90	41637,96	
140	44350,80	41774,77	
141	43317,50	41811,93	
142	41866,40	41642,74	
143	41957,90	41417,98	
144	41342,80	41247,51	
145	43539,90	41083,03	
146	44752,50	41198,81	
147	45493,70	41379,24	
148	44305,30	41679,31	
149	45741,70	41928,42	

Result			
No	d _t	y _t	
150	46249,30	41898,26	
151	45876,70	42091,88	
152	46446,60	42196,84	
153	45592,50	42225,19	
154	44895,00	42169,83	
155	45524,50	42169,36	
156	46260,30	42167,38	
157	45823,30	42174,10	
158	44776,90	42134,84	
159	43343,60	42046,09	
160	42923,00	41888,48	

APPENDIX_I

EGARCH-LTS RESULTS FOR TRAINING AND TEST

Training			Result		
Result					
No	d_t	y_t	No	d_t	y_t
1	10225,80	42430,32	37	10961,30	13746,02
2	10204,10	40260,40	38	10817,50	13653,99
3	10412,70	37450,78	39	10744,70	13736,29
4	10124,90	15609,56	40	10614,10	13723,43
5	10280,70	14666,28	41	10666,60	13717,85
6	10467,90	13661,38	42	10604,30	13718,10
7	10348,30	13581,20	43	9482,92	13689,76
8	10590,30	13587,38	44	10581,50	13616,40
9	10570,40	13579,43	45	9938,21	13622,52
10	10544,70	13615,28	46	9644,31	13571,47
11	10881,90	13630,89	47	9406,56	13528,50
12	10825,90	13647,21	48	8892,65	13423,40
13	10931,10	13683,34	49	9187,88	13465,79
14	10742,90	13695,97	50	9408,46	13350,95
15	10725,70	13704,23	51	9572,25	13338,93
16	10945,70	13732,23	52	9631,43	13324,99
17	11032,00	13727,06	53	9475,09	13310,92
18	11122,00	13746,83	54	9773,83	13354,04
19	10658,30	13745,75	55	9804,88	13378,77
20	10659,90	13740,88	56	10153,20	13399,49
21	10921,80	13751,28	57	10415,00	13430,76
22	11013,80	13749,77	58	10743,00	13456,67
23	11302,50	13752,15	59	10512,90	13533,48
24	11775,50	13742,31	60	10886,20	13555,81
25	11607,30	13812,11	61	10629,70	13634,92
26	11669,30	13864,28	62	10565,90	13656,26
27	11754,00	13910,13	63	11103,40	13683,14
28	11392,60	13969,17	64	11169,00	13691,73
29	11272,70	13988,88	65	11366,00	13746,36
30	11291,90	13951,02	66	11219,20	13751,81
31	11486,80	13946,05	67	11254,00	13786,45
32	11574,40	13936,08	68	11504,70	13850,98
33	10128,90	13906,72	69	11405,20	13865,24
34	10616,10	13825,62	70	11119,60	13891,26
35	10815,50	13809,85	71	11341,40	13867,30
36	10841,80	13781,00	72	11311,10	13886,54

Result			
No	d_t	y_t	
73	11436,20	13894,48	
74	11510,00	13884,02	
75	11467,60	13880,72	
76	11300,70	13914,35	
77	11112,10	13901,35	
78	10962,90	13900,63	
79	10676,30	13874,92	
80	10783,90	13825,98	
81	10640,40	13786,90	
82	10712,90	13742,03	
83	10590,70	13718,43	
84	10393,30	13683,89	
85	10229,40	13678,15	
86	10306,30	13638,39	
87	10427,00	13631,23	
88	10540,90	13608,04	
89	10695,20	13600,16	
90	11056,30	13609,47	
91	11125,30	13655,72	
92	11088,90	13695,87	
93	11437,40	13734,48	
94	11407,10	13792,08	
95	11381,40	13842,28	
96	11579,30	13860,15	
97	11346,50	13889,78	
98	11084,70	13918,42	
99	11129,70	13891,00	
100	10973,40	13882,88	
101	10827,80	13866,01	
102	10644,70	13810,99	
103	10597,30	13767,79	
104	10489,20	13746,79	
105	10713,90	13701,20	
106	11036,70	13687,89	
107	11169,20	13690,11	
108	11107,50	13714,62	
109	10902,50	13733,18	
110	10783,90	13766,79	
111	10747,50	13781,01	
112	10756,80	13769,17	
113	10740,20	13746,85	
114	10927,80	13720,86	
115	10981,20	13721,20	
116	10884,40	13727,23	

Result			
No	d_t	y_t	
117	10749,80	13733,27	
118	10690,90	13731,58	
119	10726,60	13739,06	
120	10502,90	13727,64	
121	10351,80	13697,97	
122	10546,90	13668,81	
123	10364,90	13659,36	
124	10399,70	13639,95	
125	10454,90	13615,79	
126	10658,80	13610,05	
127	10918,60	13635,32	
128	10791,40	13639,40	
129	10751,50	13665,48	
130	10856,90	13684,34	
131	10827,30	13714,68	
132	10544,50	13730,70	
133	10463,80	13702,17	
134	10475,20	13691,90	
135	10561,30	13681,45	
136	10598,30	13663,14	
137	10478,30	13640,52	
138	10445,00	13637,15	
139	10572,00	13635,55	
140	10621,20	13643,95	
141	11112,10	13646,10	
142	11499,90	13670,67	
143	11311,10	13721,38	
144	11547,40	13767,76	
145	11558,50	13824,73	
146	11762,30	13899,09	
147	11860,10	13947,83	
148	11916,10	13958,40	
149	11794,90	14015,27	
150	11877,50	14021,48	
151	11661,20	14057,32	
152	11688,90	14048,50	
153	11557,00	14045,53	
154	11845,90	14016,06	
155	12001,10	14030,30	
156	11798,00	14020,77	
157	11735,20	14032,91	
158	11623,40	14028,27	
159	11509,00	14049,15	
160	11611,80	14028,36	

Result			
No	d _t	y _t	
161	11652,80	13999,18	
162	11637,10	13991,70	
163	11671,80	13978,25	
164	11636,50	13977,50	
165	11631,80	13989,80	
166	11581,30	13989,83	
167	11946,70	13985,24	
168	12317,70	14010,01	
169	12507,00	14044,30	
170	12715,20	14096,83	
171	12662,50	14162,98	
172	13005,00	14251,82	
173	12958,20	14339,48	
174	13419,30	14387,35	
175	13663,50	14472,41	
176	13845,00	14533,82	
177	14031,10	14646,31	
178	13798,30	14717,14	
179	13935,70	14814,69	
180	13758,80	14867,45	
181	13255,90	14885,35	
182	13055,90	14844,11	
183	13444,00	14759,41	
184	13880,50	14750,21	
185	14210,20	14723,88	
186	15719,70	14735,22	
187	15482,70	14946,50	
188	15147,80	15150,23	
189	14907,00	15331,85	
190	15420,60	15466,39	
191	15064,80	15695,50	
192	15023,00	15568,28	
193	15382,20	15545,80	
194	15596,80	15564,10	
195	15381,90	15654,93	
196	15358,70	15608,08	
197	15595,30	15662,41	
198	15300,40	15743,10	
199	14829,50	15727,50	
200	14866,30	15639,85	
201	14564,80	15605,94	
202	14673,40	15525,37	
203	15379,70	15416,36	
204	15754,30	15412,20	

Result			
No	d _t	y _t	
205	16341,20	15494,93	
206	16268,30	15618,47	
207	16408,30	15805,49	
208	15536,80	16046,01	
209	15708,10	16066,55	
210	15528,60	16131,91	
211	15224,10	16023,25	
212	15771,40	15917,58	
213	16056,60	15809,18	
214	16080,70	15880,71	
215	15687,10	15880,90	
216	15760,50	15887,75	
217	15780,20	15999,27	
218	14617,50	15996,99	
219	16007,60	15825,96	
220	16242,00	15847,56	
221	16389,60	15884,05	
222	16271,90	15933,04	
223	16504,80	15924,28	
224	16913,30	16274,09	
225	16861,00	16336,54	
226	16614,70	16442,09	
227	16551,60	16466,79	
228	16955,20	16534,89	
229	17410,00	16617,70	
230	17208,50	16667,40	
231	17230,80	16691,48	
232	17742,40	16784,97	
233	18206,10	16983,06	
234	18387,60	17166,75	
235	18242,00	17285,25	
236	18239,90	17456,46	
237	17643,70	17654,83	
238	17996,80	17656,93	
239	17973,90	17666,44	
240	18292,90	17588,40	
241	18625,00	17597,27	
242	19147,70	17612,01	
243	19696,60	17879,42	
244	19013,80	18125,67	
245	19382,80	18310,37	
246	19404,90	18560,52	
247	19926,50	18739,12	
248	19558,80	18909,85	

Result			
No	d _t	y _t	
249	19460,30	18824,81	
250	18818,60	18974,23	
251	18952,20	18852,89	
252	18301,20	18839,29	
253	17788,60	18499,80	
254	18832,80	18213,19	
255	18899,90	18095,85	
256	18518,10	18070,99	
257	18356,50	17919,36	
258	17899,50	17936,93	
259	17902,00	18024,33	
260	17282,30	17852,53	
261	17259,30	17590,12	
262	17033,80	17408,37	
263	16965,80	17175,26	
264	17641,00	17041,77	
265	17418,50	16965,81	
266	18000,30	16964,93	
267	18885,90	17053,89	
268	19000,50	17322,69	
269	19324,50	17641,24	
270	19010,10	17886,10	
271	19478,70	18216,33	
272	18606,00	18538,15	
273	18603,80	18473,58	
274	18284,00	18479,56	
275	18497,70	18283,07	
276	18707,10	18237,87	
277	18771,60	18030,93	
278	18889,20	18069,42	
279	18786,40	18073,96	
280	19356,60	18176,87	
281	19171,90	18337,80	
282	19015,50	18401,59	
283	19165,70	18459,82	
284	19495,40	18521,77	
285	19488,50	18688,07	
286	19798,80	18667,84	
287	19381,40	18797,51	
288	19364,40	18859,68	
289	19526,50	18930,16	
290	19321,60	18945,79	
291	19294,50	18926,43	
292	19611,10	18808,27	

Result			
No	d _t	y _t	
293	20023,80	18874,09	
294	20167,20	18982,25	
295	20185,80	19066,60	
296	20347,80	19236,61	
297	20472,60	19469,16	
298	20836,10	19661,29	
299	20887,00	19838,07	
300	20030,70	19984,29	
301	20190,80	19955,25	
302	20322,20	19984,99	
303	20485,00	19981,96	
304	20330,90	19883,38	
305	20272,90	19715,76	
306	20040,10	19798,25	
307	19419,80	19752,57	
308	19505,20	19585,55	
309	19259,50	19414,05	
310	19104,40	19198,64	
311	18678,20	18953,07	
312	18687,50	18667,58	
313	19269,50	18558,46	
314	19935,70	18486,63	
315	19528,10	18576,94	
316	19270,40	18582,64	
317	19431,50	18716,64	
318	18586,50	18912,15	
319	18217,10	18794,71	
320	18229,70	18493,24	
321	17737,90	18295,23	
322	18022,70	18015,82	
323	17678,30	17742,11	
324	18244,70	17576,32	
325	18272,40	17577,59	
326	17624,10	17526,21	
327	17002,00	17521,45	
328	16807,70	17350,97	
329	17102,50	17293,14	
330	17144,70	17108,91	
331	16645,90	16906,09	
332	16531,30	16734,14	
333	15922,40	16672,70	
334	16124,30	16561,18	
335	16334,20	16442,89	
336	16628,80	16312,95	

Result			
No	d _t	y _t	
337	17167,40	16303,08	
338	16791,10	16335,14	
339	17235,50	16448,14	
340	17164,00	16606,79	
341	17327,90	16728,87	
342	17081,10	16857,00	
343	16766,80	16816,34	
344	16867,50	16865,06	
345	17044,40	16806,14	
346	17708,20	16807,82	
347	18020,30	16837,43	
348	17604,10	16938,32	
349	17615,60	17049,36	
350	17786,40	17182,59	
351	17664,50	17343,27	
352	17079,80	17333,74	
353	17230,50	17178,72	
354	17099,00	17164,26	
355	16901,40	17081,39	
356	16964,10	16939,61	
357	16785,40	16822,40	
358	16752,80	16792,43	
359	16820,00	16706,11	
360	16888,60	16665,50	
361	17355,20	16664,28	
362	17710,40	16702,28	
363	17735,50	16819,88	
364	17967,60	16945,60	
365	18290,30	17119,10	
366	18416,40	17358,45	
367	18554,80	17525,76	
368	18237,60	17665,71	
369	18296,70	17766,27	
370	18076,90	17852,43	
371	18327,10	17824,91	
372	18368,40	17832,14	
373	18493,00	17774,51	
374	18635,20	17824,01	
375	18966,20	17855,32	
376	19157,30	18023,03	
377	18945,00	18144,60	
378	18881,30	18249,19	
379	18779,80	18338,71	
380	18628,70	18393,61	

Result			
No	d _t	y _t	
381	18904,30	18344,33	
382	18645,40	18301,97	
383	18774,60	18238,07	
384	19018,60	18217,09	
385	19111,40	18250,99	
386	19380,90	18338,22	
387	19698,10	18395,72	
388	19427,40	18600,28	
389	19048,50	18708,50	
390	19344,30	18732,02	
391	19187,60	18827,85	
392	19248,10	18791,77	
393	19392,60	18693,78	
394	18908,60	18680,28	
395	18775,50	18657,53	
396	18826,00	18549,71	
397	18832,20	18511,74	
398	19459,70	18430,54	
399	19268,10	18415,02	
400	19187,80	18451,53	
401	19286,30	18522,01	
402	19363,70	18617,73	
403	19663,60	18752,27	
404	19558,00	18764,13	
405	19572,30	18820,46	
406	19855,30	18899,33	
407	20218,40	19016,95	
408	20512,20	19191,12	
409	20525,90	19330,66	
410	20775,00	19523,79	
411	20851,60	19792,55	
412	21119,20	20015,41	
413	21468,30	20227,86	
414	21398,00	20437,45	
415	21004,10	20635,40	
416	21060,20	20691,69	
417	21705,30	20797,45	
418	21616,50	20958,00	
419	21704,80	20941,37	
420	20833,20	20998,49	
421	20373,40	20968,64	
422	21192,90	20886,94	
423	21491,40	20805,04	
424	22276,70	20740,88	

Result

No	d _t	y _t
425	22307,40	20780,33
426	22083,00	21065,04
427	22293,80	21498,90
428	22219,90	21789,73
429	21953,50	22037,62
430	21722,50	21953,97
431	21987,70	21845,83
432	21612,50	21858,22
433	22287,10	21653,69
434	22432,20	21681,16
435	22951,40	21750,71
436	22787,30	22039,10
437	22289,90	22179,87
438	22630,00	22414,46
439	22318,90	22541,37
440	22477,10	22546,64
441	22334,30	22419,18
442	22550,90	22294,85
443	22220,80	22382,29
444	22201,50	22227,76
445	22244,00	22239,11
446	21907,80	22171,12
447	22142,50	22072,26
448	22565,80	21966,17
449	22899,90	22054,26
450	22857,90	22181,19
451	23215,60	22288,72
452	23437,80	22653,06
453	23006,50	22987,03
454	23215,60	23102,06
455	22616,00	23232,89
456	22544,30	23199,29
457	22618,00	23058,29
458	22186,90	22850,99
459	22104,70	22639,88
460	22566,40	22330,39
461	23132,60	22342,83
462	23176,70	22438,02
463	22931,40	22501,28
464	23472,40	22691,29
465	23516,30	23098,38
466	23464,50	23343,60
467	23293,20	23426,09
468	22799,20	23478,91

Result

No	d _t	y _t
469	22486,20	23493,74
470	22560,90	23256,25
471	23150,10	23047,68
472	23008,10	22946,32
473	23049,50	22789,06
474	23075,60	22834,47
475	22625,40	22993,69
476	22679,90	23027,65
477	22943,70	22926,05
478	23634,80	22940,20
479	23417,90	23060,89
480	23289,70	23069,81
481	23935,20	23263,19
482	24360,60	23633,92
483	24341,40	24010,68
484	24044,60	24145,95
485	24525,30	24347,18
486	24430,80	24761,67
487	24537,70	24882,73
488	24590,80	24941,79
489	24935,80	25017,90
490	24971,70	25291,04
491	25445,20	25372,87
492	25042,00	25678,98
493	24422,90	25792,39
494	24561,90	25788,85
495	25308,30	25757,71
496	25604,70	25884,53
497	26110,20	25826,72
498	26271,30	26082,00
499	26493,00	26585,91
500	26362,70	27149,66
501	26863,20	27466,62
502	26813,10	27896,50
503	26918,10	28087,21
504	26469,40	28291,42
505	26860,00	28292,02
506	27056,00	28501,12
507	27302,70	28532,31
508	27074,10	28656,21
509	27330,40	28665,98
510	27849,80	28955,79
511	27936,50	29226,84
512	27554,80	29447,91

Result

No	d _t	y _t
513	27813,20	29505,05
514	28201,70	29780,74
515	28269,70	30034,31
516	27528,10	30115,74
517	27308,80	29995,49
518	27736,30	30009,07
519	28003,60	30029,88
520	28164,10	29932,22
521	27661,60	29846,53
522	27000,40	29868,30
523	27293,20	29820,05
524	26864,30	29769,85
525	26657,40	29442,11
526	26921,30	29003,96
527	27354,60	28802,24
528	28031,50	28869,53
529	28396,20	28992,63
530	27768,50	29375,19
531	27226,40	29657,52
532	27558,90	29820,02
533	27663,20	29987,93
534	27789,90	29879,30
535	27698,30	29671,88
536	27746,40	29635,81
537	27519,80	29784,61
538	27572,80	29762,68
539	26936,80	29767,83
540	26547,20	29527,36
541	25331,70	29246,46
542	24476,00	28586,33
543	25348,50	27793,43
544	24636,70	27198,89
545	25218,20	26420,63
546	24439,30	25968,50
547	25068,50	25644,31
548	25502,60	25855,72
549	24842,20	25809,75
550	24479,70	25861,85
551	24600,90	25639,85
552	25557,80	25804,97
553	25740,80	25916,28
554	25445,10	25881,64
555	25682,50	26017,68
556	26056,60	26397,89

Result

No	d _t	y _t
557	25831,20	26853,98
558	25786,50	26896,05
559	25370,30	26946,17
560	25078,00	26964,03
561	25293,20	26824,10
562	24542,00	26632,10
563	23853,30	26245,10
564	23285,90	25705,19
565	24143,90	25172,36
566	24175,90	24946,08
567	24419,40	24506,16
568	24730,80	24407,74
569	24798,10	24598,60
570	24484,00	25028,72
571	24070,10	25091,07
572	23519,60	25139,43
573	23591,60	24942,57
574	24253,00	24676,98
575	24137,90	24514,37
576	24560,20	24329,45
577	25099,90	24422,54
578	24950,80	24846,38
579	24702,20	25193,72
580	24688,30	25323,39
581	24662,90	25569,69
582	25114,40	25624,19
583	25325,70	25629,43
584	24921,30	25707,30
585	24846,10	25735,83
586	25205,50	25811,66
587	25464,90	26015,36
588	24329,10	26084,80
589	24140,90	25758,94
590	24119,80	25635,73
591	24054,10	25483,18
592	24453,10	25135,44
593	24977,80	24804,34
594	25236,50	24958,38
595	25230,80	25176,34
596	25799,10	25460,53
597	26051,60	25994,77
598	25533,10	26442,79
599	25478,00	26594,74
600	25779,80	26736,52

Result			
No	d _t	y _t	
601	25500,00	26961,16	
602	25725,20	26844,23	
603	25610,00	26758,35	
604	25929,90	26784,38	
605	26209,40	26909,04	
606	26579,70	27000,46	
607	26529,30	27303,93	
608	26709,20	27493,71	
609	26746,40	27842,73	
610	26779,30	28087,34	
611	27021,50	28272,92	
612	27033,40	28410,67	
613	26597,80	28558,81	
614	26811,40	28520,23	
615	27135,90	28590,37	
616	26957,30	28699,95	
617	27616,90	28636,82	
618	27702,30	28807,80	
619	27377,60	29097,22	
620	27781,40	29230,52	
621	27689,50	29460,68	
622	27842,40	29688,36	
623	27808,10	29737,15	
624	27689,20	29779,34	
625	28061,90	29883,09	
626	28500,90	29964,16	
627	28427,30	30184,90	
628	28402,70	30297,07	
629	28675,40	30470,67	
630	28713,50	30777,10	
631	28992,10	30948,06	
632	29188,10	31083,25	
633	29273,30	31290,00	
634	28730,70	31513,30	
635	29164,80	31527,77	
636	29343,00	31713,33	
637	29615,30	31799,20	
638	29776,70	31883,65	
639	29543,50	31993,90	
640	29727,10	32210,53	
641	30123,60	32371,16	
642	29945,40	32592,83	
643	29924,80	32648,70	
644	29701,00	32697,63	

Result			
No	d _t	y _t	
645	29683,20	32765,36	
646	29111,80	32771,92	
647	28175,90	32520,67	
648	28074,90	32104,57	
649	28257,70	31684,12	
650	27906,30	31302,76	
651	28000,00	30744,82	
652	28456,90	30416,01	
653	28951,40	30475,23	
654	29191,60	30646,92	
655	29372,20	30842,08	
656	29814,20	31236,70	
657	30020,40	31730,10	
658	30015,10	32137,17	
659	30908,00	32419,03	
660	31948,00	32889,80	
661	31701,60	33495,43	
662	31879,50	33873,59	
663	31832,50	34342,29	
664	31385,00	34808,07	
665	31485,40	34935,48	
666	32202,70	34891,25	
667	32711,10	35029,02	
668	32541,10	35145,09	
669	32632,40	35249,14	
670	33271,10	35530,71	
671	33294,30	35914,66	
672	33221,20	36106,31	
673	33719,30	36211,52	
674	33863,80	36468,41	
675	33465,60	36682,99	
676	33250,50	36707,93	
677	33516,00	36742,07	
678	33319,20	36825,46	
679	32745,00	36737,17	
680	33396,20	36534,51	
681	33333,20	36557,52	
682	34300,90	36538,75	
683	35624,80	36656,15	
684	34775,70	37034,08	
685	33510,40	37308,22	
686	33413,60	37363,58	
687	33506,00	37507,59	
688	34040,20	37401,75	

Result			
No	d _t	y _t	
689	33118,40	37113,83	
690	32054,30	36785,07	
691	31440,00	36528,60	
692	31850,70	36216,10	
693	31586,80	35924,52	
694	30766,70	35366,77	
695	31403,90	34827,94	
696	31428,60	34706,45	
697	31845,70	34652,80	
698	31670,00	34593,70	
699	31474,40	34591,82	
700	31273,30	34758,37	
701	31038,50	34742,39	
702	31964,00	34692,39	
703	32792,00	34731,23	
704	33152,10	34924,68	
705	33830,10	35203,27	
706	33749,40	35716,22	
707	33848,30	36249,15	
708	34709,70	36624,60	
709	34096,30	37015,39	
710	34171,50	37163,94	
711	34324,00	37251,53	
712	34866,60	37389,01	
713	35127,30	37546,84	
714	35314,30	37590,06	
715	35655,00	37780,16	
716	35254,10	38005,13	
717	36179,30	38144,28	
718	36907,80	38362,41	
719	36759,90	38601,96	
720	36621,50	38760,14	
721	37495,20	38904,02	
722	38088,70	39218,99	
723	38296,90	39424,36	
724	38573,70	39567,85	
725	39130,70	39776,24	
726	38917,80	40040,65	
727	38441,60	40173,65	
728	38587,80	40225,42	
729	37496,20	40283,93	
730	38202,20	40185,54	
731	37741,70	40120,94	
732	37870,60	39997,84	

Result			
No	d _t	y _t	
733	37631,60	39923,21	
734	37716,70	39825,08	
735	37960,10	39844,94	
736	37729,40	39811,95	
737	38210,20	39803,38	
738	38353,10	39839,90	
739	38919,50	39908,09	
740	39139,10	40018,54	
741	39015,90	40127,30	
742	39220,20	40246,11	
743	39837,30	40351,48	
744	39777,70	40491,68	
745	39790,70	40553,56	
746	40665,40	40613,73	
747	41362,50	40759,78	
748	41722,40	40910,03	
749	41905,40	41034,05	
750	43628,80	41185,83	
751	44076,90	41437,46	
752	42622,90	41616,37	
753	43645,20	41679,60	
754	44465,70	41817,82	
755	43851,40	41942,76	
756	44434,50	41934,02	
757	45746,20	41969,69	
758	45784,10	42104,58	
759	45315,20	42168,97	
760	44891,30	42206,31	
761	44590,20	42260,09	
762	45250,70	42273,08	
763	44841,00	42262,41	
764	44228,00	42222,90	
765	44855,60	42179,16	
766	44653,00	42187,05	
767	43842,70	42180,41	
768	44117,50	42120,50	
769	44772,90	42105,41	
770	44046,30	42123,45	
771	43507,50	42075,23	
772	43804,00	42034,80	
773	45361,30	42044,06	
774	46244,30	42088,76	
775	46689,00	42129,19	
776	46710,90	42218,78	

Result			
No	d _t	y _t	
777	46265,40	42333,67	
778	46553,60	42419,95	
779	46838,10	42468,94	
780	47728,50	42492,68	
781	47015,90	42521,29	
782	47493,00	42524,84	
783	46890,80	42563,19	
784	46366,20	42575,09	
785	45997,10	42563,52	
786	43889,80	42525,51	
787	42340,40	42432,83	
788	42863,40	42275,03	
789	42521,90	42141,44	
790	44346,00	41955,86	
791	42906,70	41861,70	
792	43236,70	41780,49	
793	44051,30	41819,15	
794	44688,10	41888,85	
795	44426,30	41969,58	
796	44399,40	41968,05	
797	44328,80	42042,97	
798	44531,20	42092,47	
799	43273,90	42115,93	
800	42710,50	42059,69	
801	41742,10	42000,14	
802	42507,00	41891,12	
803	42941,70	41806,73	
804	42911,30	41712,72	
805	44028,40	41668,29	
806	44070,90	41733,22	
807	44088,60	41834,72	
808	43710,60	41904,34	
809	44284,20	41953,42	
810	43099,30	42023,04	
811	42890,30	41980,72	
812	42505,00	41940,98	
813	41919,30	41879,07	
814	42212,00	41786,06	
815	41860,70	41685,59	
816	42864,90	41609,58	
817	43732,50	41598,87	
818	43872,80	41651,97	
819	45075,90	41731,54	
820	45278,40	41875,33	

Result			
No	d _t	y _t	
821	45352,50	42024,81	
822	44745,50	42126,71	
823	43752,00	42180,60	
824	43880,40	42188,41	
825	44030,40	42159,72	
826	44413,60	42112,43	
827	44647,80	42064,14	
828	44251,40	42052,71	
829	44212,80	42065,11	
830	44712,90	42082,55	
831	44563,30	42115,91	
832	43599,00	42115,83	
833	43713,20	42073,54	
834	41970,80	42065,65	
835	40268,70	41967,81	
836	41044,10	41769,75	
837	40439,20	41617,16	
838	39643,70	41405,60	
839	36351,10	41116,66	
840	37235,50	40705,85	
841	36100,70	40503,17	
842	36730,20	40019,71	
843	38593,50	39590,25	
844	38908,60	39444,09	
845	37860,80	39623,15	
846	38132,20	39636,73	
847	38395,20	39920,50	
848	39285,80	40101,42	
849	37964,00	40161,25	
850	37464,40	40060,72	
851	36709,60	40051,12	
852	35338,70	39941,44	
853	34802,60	39628,05	
854	34330,30	39145,67	
855	32384,40	38688,07	
856	32899,70	37914,14	
857	33627,40	37347,09	
858	34048,00	37010,86	
859	34807,70	36742,82	
860	34601,40	36763,26	
861	33762,00	37116,82	
862	34229,00	37255,00	
863	33132,30	37438,54	
864	31950,60	37297,26	

Result

No	d_t	y_t
865	32470,40	36831,95
866	33207,10	36531,06
867	34031,10	36384,93
868	35453,30	36235,75
869	35456,50	36609,66
870	36481,20	37154,05
871	35385,00	37810,51
872	35698,70	38158,15
873	36202,20	38465,74
874	36148,40	38616,03
875	35955,80	38694,86
876	35815,50	38622,91
877	35010,50	38708,59
878	33831,70	38614,08
879	32702,90	38315,18
880	33618,00	37857,05
881	33554,40	37525,40
882	35311,00	37070,29
883	34988,80	37055,70
884	34959,00	37152,14
885	35264,40	37507,84
886	35984,50	37806,15
887	36747,30	38197,31
888	36101,90	38380,21
889	36067,90	38528,37
890	35742,80	38710,13
891	35721,60	38808,81
892	35262,90	38789,24
893	36159,60	38601,62
894	35967,50	38625,23
895	36535,70	38570,07
896	37563,30	38662,51
897	37389,30	38898,76
898	37418,10	39129,11
899	37631,10	39286,77
900	37806,50	39516,15

**Test
Result**

No	d_t	y_t
1	51643,80	42986,72
2	51112,00	43002,27
3	53325,30	43049,77
4	52935,80	43053,92

Result

No	d_t	y_t
5	55625,40	43098,85
6	54930,70	43131,84
7	54831,90	43167,64
8	52512,40	43167,56
9	51561,90	43160,16
10	51459,20	43124,32
11	52824,90	43098,04
12	51299,30	43046,55
13	51393,60	43031,35
14	50716,40	43020,96
15	50429,90	43003,13
16	50708,20	42975,82
17	52070,60	42984,06
18	49974,80	42953,14
19	49186,40	42935,01
20	50272,50	42942,17
21	49880,90	42917,90
22	47714,10	42838,54
23	44473,30	42738,03
24	46576,90	42695,75
25	46148,80	42574,01
26	45265,00	42418,18
27	46882,00	42402,49
28	47388,60	42467,59
29	46824,00	42457,86
30	47914,40	42525,88
31	47750,70	42588,93
32	48082,20	42618,40
33	50198,60	42695,92
34	49936,90	42752,89
35	50032,60	42797,89
36	49421,40	42840,95
37	49601,40	42872,66
38	49050,40	42856,00
39	48548,90	42832,40
40	49296,20	42821,99
41	49233,10	42811,91
42	49680,50	42809,78
43	50620,90	42840,59
44	50536,50	42870,85
45	50500,90	42893,64
46	53884,10	42975,20
47	53543,10	43019,23
48	53882,10	43061,78

Result			
No	d_t	y_t	
49	53580,70	43106,81	
50	52893,20	43133,24	
51	54245,80	43143,70	
52	54390,20	43151,15	
53	54044,20	43149,93	
54	54198,00	43159,58	
55	54733,30	43176,60	
56	54164,90	43174,51	
57	54915,90	43181,86	
58	56793,00	43205,73	
59	56279,10	43217,28	
60	57910,60	43243,51	
61	57418,00	43266,23	
62	58053,40	43285,76	
63	58231,90	43297,25	
64	57185,40	43301,64	
65	57931,90	43304,88	
66	56268,20	43298,30	
67	55486,80	43284,12	
68	53969,80	43260,15	
69	55752,20	43250,20	
70	55638,90	43229,52	
71	55728,60	43220,67	
72	56446,60	43229,41	
73	56774,30	43247,12	
74	57615,70	43259,92	
75	57371,30	43271,69	
76	56855,10	43279,27	
77	56064,30	43279,48	
78	56906,00	43282,17	
79	56076,40	43271,46	
80	55160,80	43256,62	
81	53689,10	43236,56	
82	54084,00	43222,42	
83	54719,00	43203,33	
84	55664,90	43195,18	
85	54743,00	43187,92	
86	54304,50	43193,85	
87	53262,90	43189,30	
88	53577,80	43180,91	
89	52615,60	43152,21	
90	52199,30	43125,37	
91	52331,30	43104,92	
92	52682,50	43094,17	

Result			
No	d_t	y_t	
93	51452,30	43065,12	
94	53202,80	43075,58	
95	53181,20	43082,65	
96	54213,80	43100,13	
97	54320,00	43120,06	
98	54013,30	43145,07	
99	55521,20	43171,74	
100	56186,90	43197,28	
101	56490,60	43214,42	
102	56518,60	43233,99	
103	56271,30	43251,27	
104	56766,20	43261,84	
105	55239,00	43255,83	
106	54911,70	43247,39	
107	53603,40	43228,04	
108	54223,60	43211,77	
109	53847,40	43185,81	
110	55510,50	43185,08	
111	55380,70	43185,41	
112	55373,20	43197,92	
113	55233,00	43209,26	
114	55698,40	43224,52	
115	55538,10	43225,07	
116	54708,40	43220,36	
117	53541,30	43207,86	
118	52529,90	43187,08	
119	52569,50	43159,82	
120	53235,90	43134,92	
121	52730,70	43107,76	
122	52351,00	43092,54	
123	51920,60	43086,14	
124	51480,90	43072,37	
125	50377,30	43037,13	
126	49093,80	42988,79	
127	48902,80	42939,00	
128	48657,50	42880,29	
129	45544,10	42756,34	
130	44593,70	42635,13	
131	42539,50	42458,98	
132	45010,70	42329,88	
133	45497,20	42187,01	
134	43706,70	42068,81	
135	44572,70	42087,18	
136	44304,40	42153,38	

Result			
No	d_t	y_t	
137	42697,60	42044,61	
138	44452,10	42035,81	
139	45719,90	42101,28	
140	44350,80	42054,86	
141	43317,50	42036,50	
142	41866,40	42024,06	
143	41957,90	41924,09	
144	41342,80	41715,45	
145	43539,90	41664,89	
146	44752,50	41699,81	
147	45493,70	41841,54	
148	44305,30	41948,32	
149	45741,70	42158,50	

Result			
No	d_t	y_t	
150	46249,30	42261,77	
151	45876,70	42296,36	
152	46446,60	42345,61	
153	45592,50	42387,88	
154	44895,00	42364,52	
155	45524,50	42358,22	
156	46260,30	42363,09	
157	45823,30	42328,85	
158	44776,90	42304,31	
159	43343,60	42260,76	
160	42923,00	42178,16	

APPENDIX_J

GARCH-RNN RESULTS FOR TRAINING AND TEST

Training Result			Result		
No	d_t	y_t	No	d_t	y_t
1	10225,80	26224,70	35	10815,50	10959,33
2	10204,10	12884,57	36	10841,80	11218,09
3	10412,70	18649,95	37	10961,30	9968,30
4	10124,90	11162,49	38	10817,50	13541,82
5	10280,70	10683,17	39	10744,70	13264,86
6	10467,90	11643,83	40	10614,10	14825,36
7	10348,30	14123,31	41	10666,60	10609,02
8	10590,30	10188,80	42	10604,30	10732,17
9	10570,40	8375,55	43	9482,92	8438,74
10	10544,70	8702,30	44	10581,50	12077,49
11	10881,90	8656,28	45	9938,21	10651,60
12	10825,90	8547,73	46	9644,31	11224,54
13	10931,10	8562,21	47	9406,56	10253,00
14	10742,90	8549,81	48	8892,65	11602,18
15	10725,70	8811,11	49	9187,88	12571,77
16	10945,70	9110,44	50	9408,46	13482,93
17	11032,00	9278,01	51	9572,25	13285,75
18	11122,00	9507,79	52	9631,43	10901,70
19	10658,30	9867,10	53	9475,09	9007,80
20	10659,90	10109,84	54	9773,83	9048,86
21	10921,80	10076,84	55	9804,88	10416,42
22	11013,80	10437,52	56	10153,20	10477,78
23	11302,50	10417,21	57	10415,00	10727,90
24	11775,50	10983,18	58	10743,00	10155,01
25	11607,30	11106,50	59	10512,90	10920,49
26	11669,30	11331,21	60	10886,20	11079,35
27	11754,00	11169,66	61	10629,70	11360,41
28	11392,60	11334,73	62	10565,90	11359,49
29	11272,70	11205,48	63	11103,40	11593,05
30	11291,90	11881,97	64	11169,00	11344,83
31	11486,80	11970,32	65	11366,00	11601,56
32	11574,40	11735,80	66	11219,20	11681,89
33	10128,90	11902,87	67	11254,00	11490,35
34	10616,10	11777,19			

Result			
No	d_t	y_t	
68	11504,70	11766,20	
69	11405,20	11848,90	
70	11119,60	11829,23	
71	11341,40	11725,45	
72	11311,10	12007,38	
73	11436,20	11427,59	
74	11510,00	11944,69	
75	11467,60	12202,41	
76	11300,70	12234,12	
77	11112,10	12349,08	
78	10962,90	12010,83	
79	10676,30	12056,45	
80	10783,90	11899,35	
81	10640,40	11878,07	
82	10712,90	12125,92	
83	10590,70	11948,82	
84	10393,30	12078,07	
85	10229,40	11898,79	
86	10306,30	11794,26	
87	10427,00	11507,66	
88	10540,90	11558,77	
89	10695,20	11424,90	
90	11056,30	11694,74	
91	11125,30	11638,33	
92	11088,90	11575,03	
93	11437,40	11631,67	
94	11407,10	11507,86	
95	11381,40	11778,47	
96	11579,30	12057,55	
97	11346,50	12028,55	
98	11084,70	12088,08	
99	11129,70	12177,17	
100	10973,40	11866,99	
101	10827,80	12005,61	
102	10644,70	12120,63	
103	10597,30	11988,04	
104	10489,20	12059,98	
105	10713,90	12028,15	
106	11036,70	11715,76	
107	11169,20	11718,10	
108	11107,50	11591,94	
109	10902,50	11820,61	
110	10783,90	11693,14	
111	10747,50	11813,33	

Result			
No	d_t	y_t	
112	10756,80	11823,41	
113	10740,20	11891,45	
114	10927,80	11898,08	
115	10981,20	11874,35	
116	10884,40	11704,38	
117	10749,80	11808,06	
118	10690,90	11805,09	
119	10726,60	11729,06	
120	10502,90	11784,63	
121	10351,80	11884,01	
122	10546,90	11851,80	
123	10364,90	11857,95	
124	10399,70	11641,42	
125	10454,90	11692,26	
126	10658,80	11715,63	
127	10918,60	11656,47	
128	10791,40	11660,62	
129	10751,50	11687,38	
130	10856,90	11546,06	
131	10827,30	11548,03	
132	10544,50	11658,12	
133	10463,80	11794,30	
134	10475,20	11820,01	
135	10561,30	11828,91	
136	10598,30	11570,59	
137	10478,30	11667,19	
138	10445,00	11797,25	
139	10572,00	11836,84	
140	10621,20	11611,18	
141	11112,10	11596,86	
142	11499,90	11455,45	
143	11311,10	11521,31	
144	11547,40	11807,11	
145	11558,50	11574,54	
146	11762,30	11900,21	
147	11860,10	12127,87	
148	11916,10	12436,83	
149	11794,90	12281,58	
150	11877,50	12323,44	
151	11661,20	11758,11	
152	11688,90	11953,64	
153	11557,00	12264,08	
154	11845,90	12370,86	
155	12001,10	12392,24	

Result			
No	d _t	y _t	
156	11798,00	12436,17	
157	11735,20	12492,98	
158	11623,40	12475,83	
159	11509,00	12426,75	
160	11611,80	12421,39	
161	11652,80	12379,81	
162	11637,10	12429,68	
163	11671,80	12473,00	
164	11636,50	12248,39	
165	11631,80	12344,66	
166	11581,30	12261,82	
167	11946,70	12335,16	
168	12317,70	12310,20	
169	12507,00	12287,76	
170	12715,20	12383,68	
171	12662,50	12436,53	
172	13005,00	12575,52	
173	12958,20	12819,97	
174	13419,30	12951,66	
175	13663,50	13017,22	
176	13845,00	12934,48	
177	14031,10	12993,73	
178	13798,30	12967,06	
179	13935,70	13621,28	
180	13758,80	13646,83	
181	13255,90	14005,90	
182	13055,90	13553,26	
183	13444,00	13823,38	
184	13880,50	13406,51	
185	14210,20	13380,83	
186	15719,70	13818,06	
187	15482,70	13882,05	
188	15147,80	13036,59	
189	14907,00	13563,88	
190	15420,60	12593,16	
191	15064,80	14640,23	
192	15023,00	15507,44	
193	15382,20	16366,67	
194	15596,80	13389,24	
195	15381,90	14452,10	
196	15358,70	11398,96	
197	15595,30	15102,33	
198	15300,40	15003,08	
199	14829,50	15096,73	

Result			
No	d _t	y _t	
200	14866,30	14918,01	
201	14564,80	14871,97	
202	14673,40	15227,65	
203	15379,70	14731,41	
204	15754,30	15175,41	
205	16341,20	14868,12	
206	16268,30	15239,81	
207	16408,30	14594,98	
208	15536,80	15230,74	
209	15708,10	15084,89	
210	15528,60	15581,65	
211	15224,10	15432,60	
212	15771,40	15314,56	
213	16056,60	15012,67	
214	16080,70	15844,07	
215	15687,10	15658,30	
216	15760,50	15107,44	
217	15780,20	15599,11	
218	14617,50	14410,97	
219	16007,60	15551,02	
220	16242,00	14747,84	
221	16389,60	14672,88	
222	16271,90	13824,03	
223	16504,80	14729,07	
224	16913,30	17241,13	
225	16861,00	17183,15	
226	16614,70	16553,96	
227	16551,60	14205,76	
228	16955,20	12879,12	
229	17410,00	12667,64	
230	17208,50	16205,92	
231	17230,80	16792,27	
232	17742,40	16803,50	
233	18206,10	16866,59	
234	18387,60	16660,19	
235	18242,00	17301,54	
236	18239,90	17357,83	
237	17643,70	17667,24	
238	17996,80	17737,24	
239	17973,90	17506,64	
240	18292,90	17799,34	
241	18625,00	17760,47	
242	19147,70	17896,08	
243	19696,60	18052,91	

Result			
No	d _t	y _t	
244	19013,80	18451,41	
245	19382,80	18211,10	
246	19404,90	18315,98	
247	19926,50	18082,51	
248	19558,80	18622,81	
249	19460,30	19678,53	
250	18818,60	19645,65	
251	18952,20	19637,44	
252	18301,20	18673,70	
253	17788,60	18789,68	
254	18832,80	18271,22	
255	18899,90	18865,21	
256	18518,10	18487,14	
257	18356,50	18419,61	
258	17899,50	18002,59	
259	17902,00	19241,46	
260	17282,30	17834,41	
261	17259,30	18588,08	
262	17033,80	16761,85	
263	16965,80	17583,79	
264	17641,00	15852,39	
265	17418,50	17746,48	
266	18000,30	17141,61	
267	18885,90	17468,62	
268	19000,50	16457,44	
269	19324,50	17381,09	
270	19010,10	17004,26	
271	19478,70	18074,53	
272	18606,00	18329,29	
273	18603,80	19115,21	
274	18284,00	17939,25	
275	18497,70	18302,57	
276	18707,10	17897,39	
277	18771,60	18066,94	
278	18889,20	19121,40	
279	18786,40	19108,14	
280	19356,60	18139,02	
281	19171,90	18262,08	
282	19015,50	17393,39	
283	19165,70	18770,97	
284	19495,40	18689,63	
285	19488,50	19034,36	
286	19798,80	19249,57	
287	19381,40	19428,51	

Result			
No	d _t	y _t	
288	19364,40	19356,67	
289	19526,50	19405,32	
290	19321,60	18886,66	
291	19294,50	19340,81	
292	19611,10	19582,97	
293	20023,80	19673,51	
294	20167,20	19476,71	
295	20185,80	19526,68	
296	20347,80	19559,61	
297	20472,60	19570,15	
298	20836,10	19996,54	
299	20887,00	20110,50	
300	20030,70	20282,21	
301	20190,80	20541,80	
302	20322,20	20364,37	
303	20485,00	20092,79	
304	20330,90	20122,85	
305	20272,90	20946,30	
306	20040,10	20937,71	
307	19419,80	21002,98	
308	19505,20	19772,84	
309	19259,50	19994,92	
310	19104,40	18883,32	
311	18678,20	19843,26	
312	18687,50	20019,33	
313	19269,50	19684,77	
314	19935,70	19424,97	
315	19528,10	18817,26	
316	19270,40	19216,66	
317	19431,50	18614,80	
318	18586,50	19275,79	
319	18217,10	19134,52	
320	18229,70	19245,15	
321	17737,90	18833,85	
322	18022,70	18658,78	
323	17678,30	18407,34	
324	18244,70	18308,14	
325	18272,40	18292,51	
326	17624,10	17736,49	
327	17002,00	17785,85	
328	16807,70	16831,58	
329	17102,50	17325,00	
330	17144,70	17283,24	
331	16645,90	17002,39	

Result			
No	d _t	y _t	
332	16531,30	17643,90	
333	15922,40	17595,84	
334	16124,30	16597,47	
335	16334,20	16021,39	
336	16628,80	15722,60	
337	17167,40	15524,14	
338	16791,10	16748,09	
339	17235,50	16440,99	
340	17164,00	16600,16	
341	17327,90	15604,62	
342	17081,10	16419,42	
343	16766,80	16257,76	
344	16867,50	17127,48	
345	17044,40	17017,11	
346	17708,20	16765,63	
347	18020,30	16330,91	
348	17604,10	16825,16	
349	17615,60	17019,90	
350	17786,40	17040,85	
351	17664,50	17190,25	
352	17079,80	17317,69	
353	17230,50	17715,64	
354	17099,00	17432,61	
355	16901,40	17508,28	
356	16964,10	16363,68	
357	16785,40	17297,70	
358	16752,80	17169,70	
359	16820,00	17334,78	
360	16888,60	16730,64	
361	17355,20	16808,51	
362	17710,40	16271,75	
363	17735,50	16749,40	
364	17967,60	16955,06	
365	18290,30	16898,35	
366	18416,40	17203,43	
367	18554,80	17468,99	
368	18237,60	17821,13	
369	18296,70	17912,14	
370	18076,90	18063,66	
371	18327,10	17876,36	
372	18368,40	17917,73	
373	18493,00	18337,82	
374	18635,20	18332,50	
375	18966,20	18359,45	

Result			
No	d _t	y _t	
376	19157,30	18333,48	
377	18945,00	18472,91	
378	18881,30	18375,34	
379	18779,80	18635,24	
380	18628,70	18711,06	
381	18904,30	18748,42	
382	18645,40	18914,76	
383	18774,60	18945,65	
384	19018,60	18922,67	
385	19111,40	18702,26	
386	19380,90	18769,23	
387	19698,10	18865,15	
388	19427,40	18988,52	
389	19048,50	19148,16	
390	19344,30	19116,86	
391	19187,60	19046,08	
392	19248,10	19099,09	
393	19392,60	19320,38	
394	18908,60	19471,06	
395	18775,50	19608,45	
396	18826,00	19315,59	
397	18832,20	18894,65	
398	19459,70	18771,86	
399	19268,10	18886,66	
400	19187,80	19163,16	
401	19286,30	19238,20	
402	19363,70	18865,05	
403	19663,60	19059,41	
404	19558,00	18929,33	
405	19572,30	19508,60	
406	19855,30	19351,95	
407	20218,40	19479,74	
408	20512,20	18947,19	
409	20525,90	19652,82	
410	20775,00	19949,13	
411	20851,60	20090,39	
412	21119,20	20322,17	
413	21468,30	20368,91	
414	21398,00	20686,39	
415	21004,10	20963,56	
416	21060,20	21050,94	
417	21705,30	21066,53	
418	21616,50	21109,16	
419	21704,80	21385,02	

Result

No	d _t	y _t
420	20833,20	21495,31
421	20373,40	21733,27
422	21192,90	21668,38
423	21491,40	20920,12
424	22276,70	20938,84
425	22307,40	21094,38
426	22083,00	21947,54
427	22293,80	21884,33
428	22219,90	21644,06
429	21953,50	22053,37
430	21722,50	20823,76
431	21987,70	22344,61
432	21612,50	21315,06
433	22287,10	22384,78
434	22432,20	21457,63
435	22951,40	22445,79
436	22787,30	22168,30
437	22289,90	22478,03
438	22630,00	22651,58
439	22318,90	22607,46
440	22477,10	22637,16
441	22334,30	22410,56
442	22550,90	22806,67
443	22220,80	22381,11
444	22201,50	23090,09
445	22244,00	22296,21
446	21907,80	22600,28
447	22142,50	22184,59
448	22565,80	22501,29
449	22899,90	22392,17
450	22857,90	22561,67
451	23215,60	22604,92
452	23437,80	22720,70
453	23006,50	22883,65
454	23215,60	23033,25
455	22616,00	23184,27
456	22544,30	23126,24
457	22618,00	23232,34
458	22186,90	23048,59
459	22104,70	23032,52
460	22566,40	23345,50
461	23132,60	22759,00
462	23176,70	22897,67
463	22931,40	22529,10

Result

No	d _t	y _t
464	23472,40	22898,53
465	23516,30	22720,21
466	23464,50	23230,88
467	23293,20	23200,41
468	22799,20	23271,51
469	22486,20	23691,74
470	22560,90	23407,82
471	23150,10	22994,27
472	23008,10	23156,90
473	23049,50	23415,44
474	23075,60	23133,16
475	22625,40	23466,40
476	22679,90	23185,23
477	22943,70	23020,95
478	23634,80	22801,73
479	23417,90	22978,33
480	23289,70	23556,85
481	23935,20	23035,67
482	24360,60	23599,73
483	24341,40	23616,88
484	24044,60	23763,60
485	24525,30	23917,70
486	24430,80	24396,65
487	24537,70	24438,69
488	24590,80	23948,41
489	24935,80	24680,99
490	24971,70	24897,04
491	25445,20	24653,91
492	25042,00	24934,50
493	24422,90	25249,87
494	24561,90	25140,18
495	25308,30	25044,91
496	25604,70	25109,89
497	26110,20	25335,10
498	26271,30	25616,97
499	26493,00	25870,82
500	26362,70	26211,76
501	26863,20	25754,39
502	26813,10	26303,75
503	26918,10	26176,96
504	26469,40	26943,71
505	26860,00	26488,14
506	27056,00	27334,60
507	27302,70	26925,34

Result			
No	d _t	y _t	
508	27074,10	27202,87	
509	27330,40	27344,36	
510	27849,80	27535,42	
511	27936,50	27471,48	
512	27554,80	27684,43	
513	27813,20	27667,63	
514	28201,70	27886,08	
515	28269,70	28129,66	
516	27528,10	28111,40	
517	27308,80	28201,94	
518	27736,30	28409,22	
519	28003,60	28102,27	
520	28164,10	27802,55	
521	27661,60	28325,98	
522	27000,40	28219,91	
523	27293,20	28607,27	
524	26864,30	27795,97	
525	26657,40	27502,90	
526	26921,30	27151,83	
527	27354,60	27928,48	
528	28031,50	27642,85	
529	28396,20	27724,10	
530	27768,50	27696,70	
531	27226,40	27668,09	
532	27558,90	27790,48	
533	27663,20	28101,04	
534	27789,90	27609,58	
535	27698,30	28057,79	
536	27746,40	28192,32	
537	27519,80	28313,41	
538	27572,80	27788,39	
539	26936,80	27887,52	
540	26547,20	27512,06	
541	25331,70	27810,44	
542	24476,00	27445,26	
543	25348,50	27324,64	
544	24636,70	26294,01	
545	25218,20	25888,81	
546	24439,30	26298,73	
547	25068,50	25833,63	
548	25502,60	26142,99	
549	24842,20	24715,52	
550	24479,70	24889,41	
551	24600,90	24050,82	

Result			
No	d _t	y _t	
552	25557,80	24976,38	
553	25740,80	24752,29	
554	25445,10	25072,29	
555	25682,50	25098,40	
556	26056,60	25333,10	
557	25831,20	25742,00	
558	25786,50	25637,89	
559	25370,30	25685,75	
560	25078,00	25905,01	
561	25293,20	26196,29	
562	24542,00	25006,90	
563	23853,30	25998,77	
564	23285,90	25691,33	
565	24143,90	25248,70	
566	24175,90	24632,30	
567	24419,40	24719,43	
568	24730,80	24517,49	
569	24798,10	24875,13	
570	24484,00	24906,99	
571	24070,10	24541,76	
572	23519,60	24000,62	
573	23591,60	23969,58	
574	24253,00	24246,69	
575	24137,90	23684,54	
576	24560,20	24776,39	
577	25099,90	24616,48	
578	24950,80	24659,40	
579	24702,20	24834,48	
580	24688,30	24394,82	
581	24662,90	24792,77	
582	25114,40	24602,11	
583	25325,70	25176,46	
584	24921,30	24869,28	
585	24846,10	25410,13	
586	25205,50	25294,64	
587	25464,90	25061,43	
588	24329,10	25337,68	
589	24140,90	25387,92	
590	24119,80	25639,07	
591	24054,10	24799,07	
592	24453,10	24342,97	
593	24977,80	25194,74	
594	25236,50	24965,72	
595	25230,80	25562,40	

Result			
No	d _t	y _t	
596	25799,10	24330,41	
597	26051,60	24891,39	
598	25533,10	24112,97	
599	25478,00	25847,65	
600	25779,80	25823,17	
601	25500,00	25845,61	
602	25725,20	25796,83	
603	25610,00	25916,89	
604	25929,90	26110,55	
605	26209,40	26242,01	
606	26579,70	25798,52	
607	26529,30	26248,88	
608	26709,20	26202,21	
609	26746,40	26634,12	
610	26779,30	26659,14	
611	27021,50	26750,58	
612	27033,40	26935,32	
613	26597,80	27145,67	
614	26811,40	27097,91	
615	27135,90	27254,55	
616	26957,30	27107,32	
617	27616,90	27252,50	
618	27702,30	27406,40	
619	27377,60	27735,37	
620	27781,40	27583,14	
621	27689,50	27637,15	
622	27842,40	27942,52	
623	27808,10	27639,95	
624	27689,20	28171,31	
625	28061,90	27992,37	
626	28500,90	28226,33	
627	28427,30	27970,82	
628	28402,70	28484,60	
629	28675,40	28389,78	
630	28713,50	28683,82	
631	28992,10	28826,83	
632	29188,10	28773,90	
633	29273,30	29069,68	
634	28730,70	29209,09	
635	29164,80	29195,58	
636	29343,00	29393,09	
637	29615,30	29392,58	
638	29776,70	29391,85	
639	29543,50	29725,91	

Result			
No	d _t	y _t	
640	29727,10	29901,56	
641	30123,60	29971,32	
642	29945,40	29872,76	
643	29924,80	29990,02	
644	29701,00	29910,59	
645	29683,20	30298,06	
646	29111,80	30317,64	
647	28175,90	29916,45	
648	28074,90	29883,58	
649	28257,70	29725,62	
650	27906,30	28879,69	
651	28000,00	28879,40	
652	28456,90	29059,54	
653	28951,40	28885,21	
654	29191,60	28934,44	
655	29372,20	28523,69	
656	29814,20	28666,40	
657	30020,40	28900,88	
658	30015,10	29899,18	
659	30908,00	29653,49	
660	31948,00	29990,94	
661	31701,60	30917,55	
662	31879,50	30880,22	
663	31832,50	31091,55	
664	31385,00	32010,00	
665	31485,40	31839,23	
666	32202,70	31691,77	
667	32711,10	32002,82	
668	32541,10	32240,61	
669	32632,40	31969,37	
670	33271,10	32528,29	
671	33294,30	33547,19	
672	33221,20	33035,24	
673	33719,30	33003,06	
674	33863,80	33369,76	
675	33465,60	33970,25	
676	33250,50	33323,67	
677	33516,00	34012,33	
678	33319,20	33915,16	
679	32745,00	33727,95	
680	33396,20	33417,23	
681	33333,20	33982,71	
682	34300,90	33813,03	
683	35624,80	33591,20	

Result			
No	d_t	y_t	
684	34775,70	34866,22	
685	33510,40	34864,14	
686	33413,60	34484,36	
687	33506,00	35343,43	
688	34040,20	33887,91	
689	33118,40	33783,21	
690	32054,30	34224,67	
691	31440,00	33912,90	
692	31850,70	33527,07	
693	31586,80	31953,09	
694	30766,70	32656,17	
695	31403,90	31793,97	
696	31428,60	33348,11	
697	31845,70	32034,78	
698	31670,00	31294,10	
699	31474,40	31602,43	
700	31273,30	31768,34	
701	31038,50	32307,71	
702	31964,00	31697,70	
703	32792,00	31682,37	
704	33152,10	32036,15	
705	33830,10	32512,71	
706	33749,40	33017,20	
707	33848,30	33579,74	
708	34709,70	33408,55	
709	34096,30	33902,07	
710	34171,50	34209,32	
711	34324,00	33957,51	
712	34866,60	34203,36	
713	35127,30	34864,88	
714	35314,30	35004,39	
715	35655,00	34991,98	
716	35254,10	35630,83	
717	36179,30	35474,65	
718	36907,80	35574,79	
719	36759,90	36503,68	
720	36621,50	36409,34	
721	37495,20	36537,31	
722	38088,70	37254,12	
723	38296,90	37601,25	
724	38573,70	37435,47	
725	39130,70	37992,51	
726	38917,80	38616,24	
727	38441,60	38518,60	

Result			
No	d_t	y_t	
728	38587,80	38842,83	
729	37496,20	39048,89	
730	38202,20	38446,51	
731	37741,70	38718,47	
732	37870,60	38467,72	
733	37631,60	38467,41	
734	37716,70	38377,58	
735	37960,10	38172,79	
736	37729,40	38533,83	
737	38210,20	37920,83	
738	38353,10	38424,35	
739	38919,50	38070,72	
740	39139,10	38993,82	
741	39015,90	38941,49	
742	39220,20	39056,60	
743	39837,30	39145,94	
744	39777,70	39514,68	
745	39790,70	39484,38	
746	40665,40	39551,78	
747	41362,50	40095,08	
748	41722,40	40662,97	
749	41905,40	40500,70	
750	43628,80	41142,51	
751	44076,90	41847,66	
752	42622,90	42446,97	
753	43645,20	41600,76	
754	44465,70	43024,38	
755	43851,40	42914,57	
756	44434,50	42250,80	
757	45746,20	43331,68	
758	45784,10	43417,88	
759	45315,20	43962,87	
760	44891,30	43018,75	
761	44590,20	44235,71	
762	45250,70	43562,46	
763	44841,00	43790,13	
764	44228,00	43847,27	
765	44855,60	43352,81	
766	44653,00	43640,44	
767	43842,70	43604,22	
768	44117,50	43498,99	
769	44772,90	43390,65	
770	44046,30	43538,56	
771	43507,50	43341,56	

Result			
No	d _t	y _t	
772	43804,00	43081,79	
773	45361,30	43219,46	
774	46244,30	43647,82	
775	46689,00	43853,86	
776	46710,90	43782,42	
777	46265,40	44336,23	
778	46553,60	44639,22	
779	46838,10	44273,48	
780	47728,50	44613,55	
781	47015,90	44646,80	
782	47493,00	44485,06	
783	46890,80	44529,46	
784	46366,20	45007,92	
785	45997,10	44792,99	
786	43889,80	44366,69	
787	42340,40	43973,48	
788	42863,40	43748,68	
789	42521,90	42648,42	
790	44346,00	42512,37	
791	42906,70	43044,22	
792	43236,70	42708,28	
793	44051,30	43275,69	
794	44688,10	43204,67	
795	44426,30	43216,19	
796	44399,40	41938,95	
797	44328,80	43828,76	
798	44531,20	44067,29	
799	43273,90	42968,13	
800	42710,50	42540,19	
801	41742,10	43262,80	
802	42507,00	42718,47	
803	42941,70	42515,79	
804	42911,30	42358,16	
805	44028,40	42198,25	
806	44070,90	43025,35	
807	44088,60	43045,19	
808	43710,60	42920,88	
809	44284,20	42743,76	
810	43099,30	43483,74	
811	42890,30	42569,70	
812	42505,00	43119,87	
813	41919,30	42415,51	
814	42212,00	42356,51	
815	41860,70	42044,40	

Result			
No	d _t	y _t	
816	42864,90	42073,82	
817	43732,50	42499,49	
818	43872,80	42401,22	
819	45075,90	42613,21	
820	45278,40	42934,69	
821	45352,50	43859,58	
822	44745,50	43321,43	
823	43752,00	43543,91	
824	43880,40	43622,11	
825	44030,40	43104,47	
826	44413,60	43120,86	
827	44647,80	43252,20	
828	44251,40	43287,16	
829	44212,80	43248,17	
830	44712,90	43795,76	
831	44563,30	43431,54	
832	43599,00	43359,38	
833	43713,20	43052,52	
834	41970,80	43495,91	
835	40268,70	42674,23	
836	41044,10	42364,56	
837	40439,20	41836,15	
838	39643,70	40966,11	
839	36351,10	41108,30	
840	37235,50	39147,29	
841	36100,70	41797,44	
842	36730,20	35671,06	
843	38593,50	37904,85	
844	38908,60	37856,75	
845	37860,80	37524,39	
846	38132,20	40830,07	
847	38395,20	37580,13	
848	39285,80	37635,55	
849	37964,00	34528,86	
850	37464,40	42101,55	
851	36709,60	38054,15	
852	35338,70	38544,25	
853	34802,60	36723,49	
854	34330,30	38457,86	
855	32384,40	35252,51	
856	32899,70	35987,72	
857	33627,40	36113,35	
858	34048,00	32587,03	
859	34807,70	34342,26	

Result			
No	d _t	y _t	
860	34601,40	35091,97	
861	33762,00	34216,23	
862	34229,00	35001,33	
863	33132,30	34605,36	
864	31950,60	33862,02	
865	32470,40	32209,56	
866	33207,10	35883,48	
867	34031,10	33052,51	
868	35453,30	34154,15	
869	35456,50	33991,37	
870	36481,20	35584,06	
871	35385,00	34701,96	
872	35698,70	35845,16	
873	36202,20	35527,60	
874	36148,40	35198,00	
875	35955,80	37024,48	
876	35815,50	35490,62	
877	35010,50	36369,75	
878	33831,70	35957,39	
879	32702,90	36269,25	
880	33618,00	34929,13	
881	33554,40	34766,55	
882	35311,00	34883,07	
883	34988,80	34458,47	
884	34959,00	36140,42	
885	35264,40	34447,02	
886	35984,50	35401,22	
887	36747,30	35595,64	
888	36101,90	34817,30	
889	36067,90	36514,38	
890	35742,80	36233,92	
891	35721,60	36605,74	
892	35262,90	35237,70	
893	36159,60	37039,11	
894	35967,50	36314,11	
895	36535,70	36465,53	
896	37563,30	36013,36	
897	37389,30	37181,00	
898	37418,10	37427,39	
899	37631,10	37149,66	
900	37806,50	37748,04	
901	38433,40	37749,74	
902	37885,30	37599,93	
903	37384,80	38098,21	

Result			
No	d _t	y _t	
904	37164,90	38177,60	
905	37130,80	37974,15	
Test			
Result			
No	d _t	y _t	
1	51643,80	45770,93	
2	51112,00	46286,77	
3	53325,30	46700,62	
4	52935,80	46392,16	
5	55625,40	46541,56	
6	54930,70	47054,51	
7	54831,90	46622,92	
8	52512,40	46501,32	
9	51561,90	47140,04	
10	51459,20	45770,35	
11	52824,90	46395,16	
12	51299,30	45714,12	
13	51393,60	45468,70	
14	50716,40	45881,98	
15	50429,90	46520,61	
16	50708,20	45352,91	
17	52070,60	45746,78	
18	49974,80	46297,32	
19	49186,40	45595,97	
20	50272,50	45457,37	
21	49880,90	46001,63	
22	47714,10	45227,66	
23	44473,30	44577,23	
24	46576,90	45486,50	
25	46148,80	43730,13	
26	45265,00	43314,86	
27	46882,00	43864,11	
28	47388,60	45222,55	
29	46824,00	45321,18	
30	47914,40	44717,84	
31	47750,70	43421,13	
32	48082,20	43933,28	
33	50198,60	45993,47	
34	49936,90	46033,97	
35	50032,60	45055,47	
36	49421,40	45767,17	
37	49601,40	46097,83	
38	49050,40	45208,31	

Result

No	d_t	y_t
39	48548,90	45710,60
40	49296,20	45474,42
41	49233,10	45192,61
42	49680,50	45244,54
43	50620,90	46001,90
44	50536,50	45960,24
45	50500,90	45807,86
46	53884,10	46477,38
47	53543,10	46707,11
48	53882,10	45908,89
49	53580,70	46947,08
50	52893,20	46934,91
51	54245,80	46333,04
52	54390,20	47177,56
53	54044,20	46611,02
54	54198,00	45916,13
55	54733,30	46255,70
56	54164,90	47033,06
57	54915,90	46778,99
58	56793,00	46951,57
59	56279,10	46971,76
60	57910,60	46939,79
61	57418,00	47367,34
62	58053,40	47317,26
63	58231,90	47278,16
64	57185,40	47338,86
65	57931,90	47135,82
66	56268,20	46934,80
67	55486,80	46727,05
68	53969,80	46340,91
69	55752,20	46632,81
70	55638,90	46662,74
71	55728,60	46547,86
72	56446,60	46925,73
73	56774,30	47109,66
74	57615,70	47101,37
75	57371,30	47135,01
76	56855,10	47081,63
77	56064,30	46791,91
78	56906,00	47003,97
79	56076,40	46947,62
80	55160,80	46689,02
81	53689,10	46436,52
82	54084,00	46574,16

Result

No	d_t	y_t
83	54719,00	46434,47
84	55664,90	46663,33
85	54743,00	46550,80
86	54304,50	46646,54
87	53262,90	46722,30
88	53577,80	46597,53
89	52615,60	46116,76
90	52199,30	46160,00
91	52331,30	46256,75
92	52682,50	46255,85
93	51452,30	46087,10
94	53202,80	46263,14
95	53181,20	46494,14
96	54213,80	46483,49
97	54320,00	46703,35
98	54013,30	46724,28
99	55521,20	46972,05
100	56186,90	47221,15
101	56490,60	46884,78
102	56518,60	46881,54
103	56271,30	47096,77
104	56766,20	47151,43
105	55239,00	46956,90
106	54911,70	46845,89
107	53603,40	46341,57
108	54223,60	46535,07
109	53847,40	46361,56
110	55510,50	46610,74
111	55380,70	46829,30
112	55373,20	46729,60
113	55233,00	46873,89
114	55698,40	46964,83
115	55538,10	46867,63
116	54708,40	46758,72
117	53541,30	46663,91
118	52529,90	46286,69
119	52569,50	46119,93
120	53235,90	46338,28
121	52730,70	46212,23
122	52351,00	46159,07
123	51920,60	46295,77
124	51480,90	46277,21
125	50377,30	45752,71
126	49093,80	45531,44

Result			
No	d _t	y _t	
127	48902,80	45504,34	
128	48657,50	45331,61	
129	45544,10	44631,72	
130	44593,70	44516,06	
131	42539,50	42568,31	
132	45010,70	44420,29	
133	45497,20	43506,44	
134	43706,70	41450,48	
135	44572,70	45204,13	
136	44304,40	43274,53	
137	42697,60	42274,23	
138	44452,10	42606,13	
139	45719,90	44232,27	
140	44350,80	42611,86	
141	43317,50	43170,22	
142	41866,40	43719,32	
143	41957,90	42587,75	

Result			
No	d _t	y _t	
144	41342,80	42259,19	
145	43539,90	42113,18	
146	44752,50	42779,10	
147	45493,70	42719,50	
148	44305,30	43920,28	
149	45741,70	44047,47	
150	46249,30	43757,57	
151	45876,70	43972,80	
152	46446,60	44343,25	
153	45592,50	43701,98	
154	44895,00	43502,93	
155	45524,50	44584,37	
156	46260,30	44233,91	
157	45823,30	43757,84	
158	44776,90	43809,56	
159	43343,60	44130,14	
160	42923,00	43473,74	

APPENDIX_K

EGARCH-RNN RESULTS FOR TRAINING AND TEST

Training			Result		
Result					
No	d_t	y_t	No	d_t	y_t
1	10225,80	34673,35	36	10841,80	11898,61
2	10204,10	31603,03	37	10961,30	11799,74
3	10412,70	13157,62	38	10817,50	12123,60
4	10124,90	15309,49	39	10744,70	11762,13
5	10280,70	16125,88	40	10614,10	11749,90
6	10467,90	14260,32	41	10666,60	11992,15
7	10348,30	11082,34	42	10604,30	11674,40
8	10590,30	19754,83	43	9482,92	11707,98
9	10570,40	22164,08	44	10581,50	11792,08
10	10544,70	11856,93	45	9938,21	11683,82
11	10881,90	10881,96	46	9644,31	11472,31
12	10825,90	10895,90	47	9406,56	11574,11
13	10931,10	11109,33	48	8892,65	11748,93
14	10742,90	11430,72	49	9187,88	11212,16
15	10725,70	11694,96	50	9408,46	11380,56
16	10945,70	11625,34	51	9572,25	11366,96
17	11032,00	11758,85	52	9631,43	11020,86
18	11122,00	11772,17	53	9475,09	11309,98
19	10658,30	11786,80	54	9773,83	11230,99
20	10659,90	11865,91	55	9804,88	11076,81
21	10921,80	11828,31	56	10153,20	11244,04
22	11013,80	11804,47	57	10415,00	11169,92
23	11302,50	11781,45	58	10743,00	11268,21
24	11775,50	11884,36	59	10512,90	11313,69
25	11607,30	11900,26	60	10886,20	11394,88
26	11669,30	11869,73	61	10629,70	11526,76
27	11754,00	12107,12	62	10565,90	11492,61
28	11392,60	12065,52	63	11103,40	11608,07
29	11272,70	11989,11	64	11169,00	11727,78
30	11291,90	12245,50	65	11366,00	11585,07
31	11486,80	12114,73	66	11219,20	11829,93
32	11574,40	12027,04	67	11254,00	11936,58
33	10128,90	12236,78	68	11504,70	11797,75
34	10616,10	12115,95	69	11405,20	11985,45
35	10815,50	12105,03	70	11119,60	12004,56

Result			
No	d_t	y_t	
71	11341,40	11966,46	
72	11311,10	12101,31	
73	11436,20	11962,28	
74	11510,00	12065,90	
75	11467,60	12155,00	
76	11300,70	12008,57	
77	11112,10	12142,10	
78	10962,90	12131,01	
79	10676,30	12007,79	
80	10783,90	12033,09	
81	10640,40	12005,67	
82	10712,90	11883,12	
83	10590,70	11893,04	
84	10393,30	11871,10	
85	10229,40	11770,47	
86	10306,30	11764,77	
87	10427,00	11693,85	
88	10540,90	11605,42	
89	10695,20	11637,14	
90	11056,30	11635,29	
91	11125,30	11617,12	
92	11088,90	11675,89	
93	11437,40	11741,39	
94	11407,10	11796,26	
95	11381,40	11776,19	
96	11579,30	11927,48	
97	11346,50	12008,30	
98	11084,70	11918,64	
99	11129,70	12089,20	
100	10973,40	12119,06	
101	10827,80	11927,80	
102	10644,70	12063,44	
103	10597,30	12042,69	
104	10489,20	11848,17	
105	10713,90	11892,16	
106	11036,70	11855,48	
107	11169,20	11749,26	
108	11107,50	11785,48	
109	10902,50	11853,04	
110	10783,90	11816,58	
111	10747,50	11802,32	
112	10756,80	11823,93	
113	10740,20	11800,37	
114	10927,80	11795,66	

Result			
No	d_t	y_t	
115	10981,20	11824,72	
116	10884,40	11801,92	
117	10749,80	11832,25	
118	10690,90	11855,31	
119	10726,60	11793,73	
120	10502,90	11782,60	
121	10351,80	11780,09	
122	10546,90	11754,04	
123	10364,90	11723,65	
124	10399,70	11660,57	
125	10454,90	11710,00	
126	10658,80	11675,34	
127	10918,60	11578,89	
128	10791,40	11686,00	
129	10751,50	11670,28	
130	10856,90	11670,85	
131	10827,30	11733,93	
132	10544,50	11682,73	
133	10463,80	11749,33	
134	10475,20	11776,26	
135	10561,30	11672,28	
136	10598,30	11715,08	
137	10478,30	11735,23	
138	10445,00	11673,98	
139	10572,00	11694,79	
140	10621,20	11680,06	
141	11112,10	11626,66	
142	11499,90	11685,76	
143	11311,10	11705,52	
144	11547,40	11749,57	
145	11558,50	11931,53	
146	11762,30	11864,77	
147	11860,10	11936,06	
148	11916,10	12154,00	
149	11794,90	12082,13	
150	11877,50	12186,54	
151	11661,20	12324,55	
152	11688,90	12240,18	
153	11557,00	12325,69	
154	11845,90	12342,71	
155	12001,10	12271,55	
156	11798,00	12333,38	
157	11735,20	12325,69	
158	11623,40	12376,85	

Result

No	d _t	y _t
159	11509,00	12305,04
160	11611,80	12270,27
161	11652,80	12334,96
162	11637,10	12236,69
163	11671,80	12232,53
164	11636,50	12323,60
165	11631,80	12215,03
166	11581,30	12242,34
167	11946,70	12273,46
168	12317,70	12223,00
169	12507,00	12254,17
170	12715,20	12344,33
171	12662,50	12459,69
172	13005,00	12485,62
173	12958,20	12601,15
174	13419,30	12713,91
175	13663,50	12801,60
176	13845,00	12944,12
177	14031,10	13073,20
178	13798,30	13287,48
179	13935,70	13352,58
180	13758,80	13472,68
181	13255,90	13584,14
182	13055,90	13546,70
183	13444,00	13623,42
184	13880,50	13514,45
185	14210,20	13446,54
186	15719,70	13715,59
187	15482,70	13775,91
188	15147,80	13756,20
189	14907,00	14278,20
190	15420,60	14358,28
191	15064,80	14048,90
192	15023,00	14575,93
193	15382,20	14885,64
194	15596,80	14527,40
195	15381,90	14714,64
196	15358,70	15161,89
197	15595,30	14997,65
198	15300,40	14842,47
199	14829,50	15010,49
200	14866,30	15126,80
201	14564,80	14824,52
202	14673,40	14693,95

Result

No	d _t	y _t
203	15379,70	14867,93
204	15754,30	14803,64
205	16341,20	14585,25
206	16268,30	15027,07
207	16408,30	15107,33
208	15536,80	15012,28
209	15708,10	15287,11
210	15528,60	15342,04
211	15224,10	15189,31
212	15771,40	15303,26
213	16056,60	15510,49
214	16080,70	15231,87
215	15687,10	15396,92
216	15760,50	15681,01
217	15780,20	15277,18
218	14617,50	15245,48
219	16007,60	15416,78
220	16242,00	15332,60
221	16389,60	15008,22
222	16271,90	15425,07
223	16504,80	15923,05
224	16913,30	15193,76
225	16861,00	15589,09
226	16614,70	16218,12
227	16551,60	15764,67
228	16955,20	15938,62
229	17410,00	16188,33
230	17208,50	16178,25
231	17230,80	16518,36
232	17742,40	16529,08
233	18206,10	16582,00
234	18387,60	16746,06
235	18242,00	17182,58
236	18239,90	17267,97
237	17643,70	17235,91
238	17996,80	17433,59
239	17973,90	17605,85
240	18292,90	17483,29
241	18625,00	17654,82
242	19147,70	17936,32
243	19696,60	17853,89
244	19013,80	18159,12
245	19382,80	18416,84
246	19404,90	18497,42

Result			
No	d_t	y_t	
247	19926,50	18461,69	
248	19558,80	18806,60	
249	19460,30	19172,76	
250	18818,60	19079,79	
251	18952,20	18924,96	
252	18301,20	19145,59	
253	17788,60	18917,08	
254	18832,80	18731,93	
255	18899,90	18769,50	
256	18518,10	18349,47	
257	18356,50	18718,72	
258	17899,50	18646,02	
259	17902,00	17792,45	
260	17282,30	18108,52	
261	17259,30	18184,26	
262	17033,80	17451,66	
263	16965,80	17499,25	
264	17641,00	17392,00	
265	17418,50	17230,41	
266	18000,30	17099,36	
267	18885,90	17207,86	
268	19000,50	17333,53	
269	19324,50	17238,73	
270	19010,10	17912,65	
271	19478,70	17945,75	
272	18606,00	17871,19	
273	18603,80	18442,22	
274	18284,00	18482,37	
275	18497,70	18260,12	
276	18707,10	18405,86	
277	18771,60	18596,32	
278	18889,20	18493,85	
279	18786,40	18449,19	
280	19356,60	18516,05	
281	19171,90	18539,30	
282	19015,50	18503,13	
283	19165,70	18717,19	
284	19495,40	18663,44	
285	19488,50	18634,42	
286	19798,80	18909,40	
287	19381,40	19205,76	
288	19364,40	18922,19	
289	19526,50	19114,18	
290	19321,60	19292,84	

Result			
No	d_t	y_t	
291	19294,50	19020,52	
292	19611,10	19319,75	
293	20023,80	19285,65	
294	20167,20	19150,13	
295	20185,80	19570,16	
296	20347,80	19667,62	
297	20472,60	19514,36	
298	20836,10	19796,76	
299	20887,00	20044,21	
300	20030,70	20144,60	
301	20190,80	20147,00	
302	20322,20	20275,99	
303	20485,00	20091,99	
304	20330,90	20244,32	
305	20272,90	20603,38	
306	20040,10	20219,53	
307	19419,80	20078,36	
308	19505,20	20215,15	
309	19259,50	19967,17	
310	19104,40	19638,89	
311	18678,20	19689,13	
312	18687,50	19517,38	
313	19269,50	19105,63	
314	19935,70	19049,64	
315	19528,10	19225,94	
316	19270,40	19158,91	
317	19431,50	19156,21	
318	18586,50	18942,28	
319	18217,10	18766,89	
320	18229,70	19082,28	
321	17737,90	18630,54	
322	18022,70	18183,74	
323	17678,30	18643,83	
324	18244,70	18174,58	
325	18272,40	17816,29	
326	17624,10	18139,64	
327	17002,00	17775,68	
328	16807,70	17588,89	
329	17102,50	17312,15	
330	17144,70	17025,51	
331	16645,90	17237,48	
332	16531,30	17008,64	
333	15922,40	16699,19	
334	16124,30	16522,70	

Result

No	d _t	y _t
335	16334,20	16397,17
336	16628,80	16290,04
337	17167,40	16047,77
338	16791,10	16254,64
339	17235,50	16147,30
340	17164,00	16196,14
341	17327,90	16314,60
342	17081,10	16317,89
343	16766,80	16570,48
344	16867,50	16476,98
345	17044,40	16442,21
346	17708,20	16622,91
347	18020,30	16666,21
348	17604,10	16856,49
349	17615,60	16941,08
350	17786,40	17004,46
351	17664,50	16979,37
352	17079,80	17011,34
353	17230,50	17306,11
354	17099,00	17055,09
355	16901,40	16824,87
356	16964,10	17117,45
357	16785,40	17054,13
358	16752,80	16628,24
359	16820,00	16744,41
360	16888,60	16763,16
361	17355,20	16423,08
362	17710,40	16579,02
363	17735,50	16692,88
364	17967,60	16646,64
365	18290,30	16936,69
366	18416,40	16956,94
367	18554,80	17138,38
368	18237,60	17552,88
369	18296,70	17504,03
370	18076,90	17625,90
371	18327,10	17801,05
372	18368,40	17823,14
373	18493,00	17929,12
374	18635,20	17989,52
375	18966,20	18064,60
376	19157,30	18128,64
377	18945,00	18237,18
378	18881,30	18387,95

Result

No	d _t	y _t
379	18779,80	18428,43
380	18628,70	18348,76
381	18904,30	18458,16
382	18645,40	18578,89
383	18774,60	18460,51
384	19018,60	18532,59
385	19111,40	18628,99
386	19380,90	18483,62
387	19698,10	18771,27
388	19427,40	18844,34
389	19048,50	18732,26
390	19344,30	19006,87
391	19187,60	18944,20
392	19248,10	18753,63
393	19392,60	19187,34
394	18908,60	19146,35
395	18775,50	18793,05
396	18826,00	19072,83
397	18832,20	18932,14
398	19459,70	18610,11
399	19268,10	19031,20
400	19187,80	18878,44
401	19286,30	18769,19
402	19363,70	19001,69
403	19663,60	18747,60
404	19558,00	19036,96
405	19572,30	19200,99
406	19855,30	19016,75
407	20218,40	19262,93
408	20512,20	19381,39
409	20525,90	19567,02
410	20775,00	19849,28
411	20851,60	19875,43
412	21119,20	20069,57
413	21468,30	20357,10
414	21398,00	20571,21
415	21004,10	20724,06
416	21060,20	20890,04
417	21705,30	20959,56
418	21616,50	20986,03
419	21704,80	21259,34
420	20833,20	21607,07
421	20373,40	21218,84
422	21192,90	21022,96

Result

No	d _t	y _t
423	21491,40	21277,88
424	22276,70	21127,11
425	22307,40	21615,21
426	22083,00	21821,97
427	22293,80	21449,11
428	22219,90	21860,76
429	21953,50	21922,26
430	21722,50	21853,91
431	21987,70	22189,79
432	21612,50	21963,74
433	22287,10	21889,42
434	22432,20	22357,27
435	22951,40	22116,08
436	22787,30	22330,23
437	22289,90	22670,45
438	22630,00	22361,57
439	22318,90	22465,43
440	22477,10	22475,84
441	22334,30	22620,11
442	22550,90	22686,38
443	22220,80	22541,61
444	22201,50	22562,85
445	22244,00	22691,85
446	21907,80	22405,44
447	22142,50	22391,47
448	22565,80	22543,81
449	22899,90	22388,43
450	22857,90	22501,18
451	23215,60	22777,18
452	23437,80	22807,71
453	23006,50	22736,70
454	23215,60	23042,37
455	22616,00	23203,14
456	22544,30	22872,55
457	22618,00	23010,90
458	22186,90	23160,17
459	22104,70	22773,73
460	22566,40	22884,92
461	23132,60	22915,85
462	23176,70	22701,30
463	22931,40	23120,08
464	23472,40	23129,37
465	23516,30	22872,34
466	23464,50	23122,26

Result

No	d _t	y _t
467	23293,20	23405,49
468	22799,20	23418,98
469	22486,20	23124,99
470	22560,90	23214,70
471	23150,10	23234,04
472	23008,10	23120,81
473	23049,50	23304,47
474	23075,60	23432,58
475	22625,40	23121,32
476	22679,90	22983,02
477	22943,70	23190,46
478	23634,80	23069,50
479	23417,90	23131,24
480	23289,70	23476,49
481	23935,20	23434,88
482	24360,60	23357,55
483	24341,40	23624,89
484	24044,60	24047,19
485	24525,30	24115,03
486	24430,80	24011,83
487	24537,70	24200,56
488	24590,80	24609,28
489	24935,80	24553,68
490	24971,70	24605,70
491	25445,20	24926,93
492	25042,00	25143,25
493	24422,90	25011,40
494	24561,90	24994,43
495	25308,30	25094,59
496	25604,70	25001,21
497	26110,20	25422,23
498	26271,30	25880,83
499	26493,00	25757,34
500	26362,70	25829,48
501	26863,20	26200,31
502	26813,10	26297,27
503	26918,10	26467,79
504	26469,40	26799,14
505	26860,00	26754,58
506	27056,00	26723,56
507	27302,70	26955,44
508	27074,10	27159,88
509	27330,40	27265,85
510	27849,80	27241,00

Result			
No	d_t	y_t	
511	27936,50	27478,70	
512	27554,80	27618,14	
513	27813,20	27739,11	
514	28201,70	27734,76	
515	28269,70	27872,33	
516	27528,10	28061,03	
517	27308,80	28061,04	
518	27736,30	27774,58	
519	28003,60	27842,88	
520	28164,10	28036,82	
521	27661,60	28281,79	
522	27000,40	28066,70	
523	27293,20	27707,60	
524	26864,30	27744,52	
525	26657,40	27523,44	
526	26921,30	27510,82	
527	27354,60	27658,07	
528	28031,50	27432,86	
529	28396,20	27782,57	
530	27768,50	28071,37	
531	27226,40	27725,12	
532	27558,90	27664,02	
533	27663,20	27730,93	
534	27789,90	27629,62	
535	27698,30	28072,29	
536	27746,40	28072,92	
537	27519,80	27798,21	
538	27572,80	27823,16	
539	26936,80	27864,71	
540	26547,20	27577,53	
541	25331,70	27487,92	
542	24476,00	27034,15	
543	25348,50	26429,65	
544	24636,70	26498,88	
545	25218,20	26064,02	
546	24439,30	26334,11	
547	25068,50	25877,80	
548	25502,60	25392,51	
549	24842,20	25739,21	
550	24479,70	25510,24	
551	24600,90	25290,56	
552	25557,80	25167,22	
553	25740,80	25170,96	
554	25445,10	25598,17	

Result			
No	d_t	y_t	
555	25682,50	25780,86	
556	26056,60	25414,15	
557	25831,20	25687,69	
558	25786,50	25788,29	
559	25370,30	26012,02	
560	25078,00	25756,80	
561	25293,20	25653,41	
562	24542,00	25897,16	
563	23853,30	25440,91	
564	23285,90	25284,80	
565	24143,90	25024,74	
566	24175,90	24735,42	
567	24419,40	24828,17	
568	24730,80	25075,34	
569	24798,10	24828,48	
570	24484,00	24588,73	
571	24070,10	24813,41	
572	23519,60	24661,91	
573	23591,60	24258,77	
574	24253,00	24337,98	
575	24137,90	24561,09	
576	24560,20	24350,83	
577	25099,90	24719,45	
578	24950,80	24688,29	
579	24702,20	24580,02	
580	24688,30	24941,29	
581	24662,90	24815,15	
582	25114,40	24615,98	
583	25325,70	25169,73	
584	24921,30	25265,37	
585	24846,10	25045,53	
586	25205,50	25274,72	
587	25464,90	25178,17	
588	24329,10	25256,28	
589	24140,90	25340,68	
590	24119,80	25136,15	
591	24054,10	24702,31	
592	24453,10	24768,07	
593	24977,80	25147,62	
594	25236,50	24934,78	
595	25230,80	24949,86	
596	25799,10	25320,99	
597	26051,60	25280,47	
598	25533,10	25283,61	

Result

No	d _t	y _t
599	25478,00	25663,26
600	25779,80	25693,43
601	25500,00	25565,22
602	25725,20	25678,03
603	25610,00	26074,25
604	25929,90	25839,24
605	26209,40	25845,90
606	26579,70	26281,85
607	26529,30	26272,90
608	26709,20	26342,85
609	26746,40	26603,52
610	26779,30	26578,60
611	27021,50	26651,19
612	27033,40	26957,81
613	26597,80	26930,13
614	26811,40	26941,57
615	27135,90	27034,40
616	26957,30	27046,57
617	27616,90	27090,54
618	27702,30	27555,64
619	27377,60	27415,39
620	27781,40	27397,99
621	27689,50	27787,28
622	27842,40	27521,95
623	27808,10	27727,24
624	27689,20	28060,81
625	28061,90	27754,93
626	28500,90	27962,26
627	28427,30	28290,92
628	28402,70	28207,16
629	28675,40	28410,82
630	28713,50	28493,73
631	28992,10	28437,30
632	29188,10	28835,60
633	29273,30	28929,91
634	28730,70	28973,00
635	29164,80	28976,00
636	29343,00	29080,46
637	29615,30	29093,62
638	29776,70	29389,53
639	29543,50	29665,62
640	29727,10	29428,44
641	30123,60	29579,54
642	29945,40	29802,72

Result

No	d _t	y _t
643	29924,80	29782,60
644	29701,00	29934,71
645	29683,20	29906,86
646	29111,80	29722,27
647	28175,90	29669,25
648	28074,90	29237,40
649	28257,70	29023,02
650	27906,30	28969,17
651	28000,00	28813,97
652	28456,90	28842,01
653	28951,40	28726,18
654	29191,60	28742,84
655	29372,20	29101,89
656	29814,20	29074,11
657	30020,40	29190,86
658	30015,10	29505,87
659	30908,00	29634,31
660	31948,00	30042,36
661	31701,60	30630,72
662	31879,50	30842,53
663	31832,50	31187,40
664	31385,00	31144,82
665	31485,40	31114,89
666	32202,70	31513,29
667	32711,10	31745,54
668	32541,10	32068,51
669	32632,40	32314,32
670	33271,10	32262,37
671	33294,30	32448,81
672	33221,20	32796,01
673	33719,30	32975,92
674	33863,80	33271,26
675	33465,60	33438,03
676	33250,50	33459,75
677	33516,00	33355,48
678	33319,20	33388,92
679	32745,00	33466,07
680	33396,20	33284,04
681	33333,20	33400,65
682	34300,90	33327,10
683	35624,80	33896,57
684	34775,70	34556,83
685	33510,40	34206,11
686	33413,60	33991,30

Result			
No	d _t	y _t	
687	33506,00	33844,53	
688	34040,20	33738,82	
689	33118,40	34281,51	
690	32054,30	33917,76	
691	31440,00	32995,46	
692	31850,70	32595,96	
693	31586,80	32434,41	
694	30766,70	32221,42	
695	31403,90	31982,23	
696	31428,60	32032,00	
697	31845,70	31645,70	
698	31670,00	31886,38	
699	31474,40	31817,22	
700	31273,30	31552,82	
701	31038,50	31574,75	
702	31964,00	31453,36	
703	32792,00	31685,59	
704	33152,10	32143,10	
705	33830,10	32527,19	
706	33749,40	32848,88	
707	33848,30	32891,97	
708	34709,70	33127,60	
709	34096,30	33860,23	
710	34171,50	33749,90	
711	34324,00	34094,64	
712	34866,60	34268,10	
713	35127,30	34368,33	
714	35314,30	34785,02	
715	35655,00	34921,53	
716	35254,10	35166,95	
717	36179,30	35181,94	
718	36907,80	35762,84	
719	36759,90	36149,34	
720	36621,50	36407,85	
721	37495,20	36584,14	
722	38088,70	36988,85	
723	38296,90	37493,83	
724	38573,70	37856,99	
725	39130,70	38164,29	
726	38917,80	38599,58	
727	38441,60	38867,08	
728	38587,80	38706,53	
729	37496,20	38857,83	
730	38202,20	38499,38	

Result			
No	d _t	y _t	
731	37741,70	38833,22	
732	37870,60	38417,96	
733	37631,60	38360,48	
734	37716,70	38310,89	
735	37960,10	38080,99	
736	37729,40	38296,13	
737	38210,20	38115,86	
738	38353,10	38414,03	
739	38919,50	38439,93	
740	39139,10	38847,25	
741	39015,90	38953,22	
742	39220,20	39023,03	
743	39837,30	39281,10	
744	39777,70	39630,22	
745	39790,70	39755,90	
746	40665,40	39866,10	
747	41362,50	40330,19	
748	41722,40	40705,05	
749	41905,40	41053,37	
750	43628,80	41235,85	
751	44076,90	42076,31	
752	42622,90	42513,91	
753	43645,20	42260,57	
754	44465,70	42754,43	
755	43851,40	43116,87	
756	44434,50	43148,25	
757	45746,20	43276,03	
758	45784,10	43609,50	
759	45315,20	43877,56	
760	44891,30	43811,39	
761	44590,20	43662,66	
762	45250,70	43780,42	
763	44841,00	43998,91	
764	44228,00	43731,05	
765	44855,60	43588,94	
766	44653,00	43743,15	
767	43842,70	43589,93	
768	44117,50	43386,35	
769	44772,90	43403,66	
770	44046,30	43561,47	
771	43507,50	43447,22	
772	43804,00	43209,91	
773	45361,30	43191,54	
774	46244,30	43677,26	

Result			
No	d _t	y _t	
775	46689,00	43911,72	
776	46710,90	44027,12	
777	46265,40	44245,04	
778	46553,60	44316,79	
779	46838,10	44446,54	
780	47728,50	44509,06	
781	47015,90	44759,01	
782	47493,00	44668,43	
783	46890,80	44732,70	
784	46366,20	44601,17	
785	45997,10	44521,56	
786	43889,80	44442,14	
787	42340,40	43908,58	
788	42863,40	43446,66	
789	42521,90	43223,47	
790	44346,00	42837,24	
791	42906,70	43157,53	
792	43236,70	42575,62	
793	44051,30	42683,17	
794	44688,10	43047,65	
795	44426,30	43173,64	
796	44399,40	43377,88	
797	44328,80	43377,45	
798	44531,20	43521,10	
799	43273,90	43562,66	
800	42710,50	43186,14	
801	41742,10	42923,40	
802	42507,00	42647,82	
803	42941,70	42639,17	
804	42911,30	42586,01	
805	44028,40	42425,01	
806	44070,90	42845,86	
807	44088,60	42860,45	
808	43710,60	43058,51	
809	44284,20	43024,45	
810	43099,30	43300,90	
811	42890,30	43111,20	
812	42505,00	42979,77	
813	41919,30	42722,26	
814	42212,00	42428,68	
815	41860,70	42437,49	
816	42864,90	42025,81	
817	43732,50	42378,09	
818	43872,80	42615,40	

Result			
No	d _t	y _t	
819	45075,90	42696,87	
820	45278,40	43225,01	
821	45352,50	43431,62	
822	44745,50	43688,17	
823	43752,00	43676,76	
824	43880,40	43476,10	
825	44030,40	43556,58	
826	44413,60	43471,64	
827	44647,80	43454,36	
828	44251,40	43457,37	
829	44212,80	43330,49	
830	44712,90	43351,94	
831	44563,30	43495,88	
832	43599,00	43509,14	
833	43713,20	43331,82	
834	41970,80	43328,53	
835	40268,70	42747,11	
836	41044,10	42083,75	
837	40439,20	41976,36	
838	39643,70	41444,12	
839	36351,10	41031,06	
840	37235,50	39231,07	
841	36100,70	38959,34	
842	36730,20	38253,78	
843	38593,50	38060,13	
844	38908,60	38592,40	
845	37860,80	38433,94	
846	38132,20	38409,61	
847	38395,20	38118,17	
848	39285,80	38393,10	
849	37964,00	39139,81	
850	37464,40	38832,57	
851	36709,60	38294,34	
852	35338,70	38102,35	
853	34802,60	37091,75	
854	34330,30	36519,43	
855	32384,40	35872,40	
856	32899,70	34742,92	
857	33627,40	34497,61	
858	34048,00	34326,33	
859	34807,70	34197,91	
860	34601,40	34849,01	
861	33762,00	34356,45	
862	34229,00	33989,61	

Result			Test		
No	d _t	y _t	Result No	d _t	y _t
863	33132,30	34400,42	1	51643,80	45775,03
864	31950,60	33741,78	2	51112,00	45684,16
865	32470,40	33231,91	3	53325,30	45890,17
866	33207,10	33557,99	4	52935,80	45938,72
867	34031,10	33259,68	5	55625,40	46160,91
868	35453,30	33744,90	6	54930,70	46111,64
869	35456,50	34485,49	7	54831,90	46236,96
870	36481,20	34309,20	8	52512,40	46009,48
871	35385,00	35147,16	9	51561,90	45873,51
872	35698,70	35047,13	10	51459,20	45756,83
873	36202,20	35258,62	11	52824,90	45873,39
874	36148,40	36045,78	12	51299,30	45606,25
875	35955,80	36116,83	13	51393,60	45627,56
876	35815,50	36244,97	14	50716,40	45476,92
877	35010,50	35977,46	15	50429,90	45503,52
878	33831,70	35597,90	16	50708,20	45535,30
879	32702,90	34968,77	17	52070,60	45692,07
880	33618,00	34330,05	18	49974,80	45525,32
881	33554,40	34326,81	19	49186,40	45444,76
882	35311,00	34374,62	20	50272,50	45434,65
883	34988,80	34961,29	21	49880,90	45419,69
884	34959,00	34760,01	22	47714,10	45157,09
885	35264,40	34592,96	23	44473,30	44450,07
886	35984,50	35002,12	24	46576,90	44635,82
887	36747,30	35202,97	25	46148,80	44458,36
888	36101,90	36089,98	26	45265,00	44069,73
889	36067,90	36009,64	27	46882,00	44254,93
890	35742,80	36206,24	28	47388,60	44427,77
891	35721,60	35950,12	29	46824,00	44531,94
892	35262,90	36069,07	30	47914,40	44610,49
893	36159,60	35769,19	31	47750,70	44694,42
894	35967,50	36218,38	32	48082,20	45053,24
895	36535,70	36180,82	33	50198,60	45346,13
896	37563,30	36406,79	34	49936,90	45251,34
897	37389,30	36926,95	35	50032,60	45473,78
898	37418,10	36831,97	36	49421,40	45384,91
899	37631,10	37322,21	37	49601,40	45378,15
900	37806,50	37439,38	38	49050,40	45370,13
901	38433,40	37731,99	39	48548,90	45232,77
902	37885,30	38268,31	40	49296,20	45268,84
903	37384,80	38101,45	41	49233,10	45270,53
904	37164,90	37884,70	42	49680,50	45290,40
905	37130,80	37893,85	43	50620,90	45402,41

Result

No	d _t	y _t
44	50536,50	45470,51
45	50500,90	45556,24
46	53884,10	45947,69
47	53543,10	45961,54
48	53882,10	46115,61
49	53580,70	46073,00
50	52893,20	46013,76
51	54245,80	46125,47
52	54390,20	46087,55
53	54044,20	46032,07
54	54198,00	46103,49
55	54733,30	46065,30
56	54164,90	46027,17
57	54915,90	46122,13
58	56793,00	46218,56
59	56279,10	46267,60
60	57910,60	46377,79
61	57418,00	46328,69
62	58053,40	46400,62
63	58231,90	46396,12
64	57185,40	46316,84
65	57931,90	46297,60
66	56268,20	46229,12
67	55486,80	46081,80
68	53969,80	45963,34
69	55752,20	46025,66
70	55638,90	46001,74
71	55728,60	46082,47
72	56446,60	46088,30
73	56774,30	46239,62
74	57615,70	46294,81
75	57371,30	46331,80
76	56855,10	46283,46
77	56064,30	46262,54
78	56906,00	46249,56
79	56076,40	46144,22
80	55160,80	46109,40
81	53689,10	45937,34
82	54084,00	45942,02
83	54719,00	45951,97
84	55664,90	46049,13
85	54743,00	46001,35
86	54304,50	46049,51
87	53262,90	45946,30

Result

No	d _t	y _t
88	53577,80	45979,25
89	52615,60	45867,98
90	52199,30	45835,71
91	52331,30	45778,88
92	52682,50	45799,58
93	51452,30	45660,02
94	53202,80	45847,27
95	53181,20	45861,71
96	54213,80	46054,83
97	54320,00	46061,46
98	54013,30	46078,44
99	55521,20	46213,38
100	56186,90	46283,59
101	56490,60	46273,29
102	56518,60	46329,92
103	56271,30	46278,10
104	56766,20	46281,74
105	55239,00	46180,66
106	54911,70	46098,40
107	53603,40	45981,15
108	54223,60	45980,83
109	53847,40	45890,58
110	55510,50	46036,33
111	55380,70	46033,47
112	55373,20	46143,65
113	55233,00	46114,72
114	55698,40	46210,70
115	55538,10	46182,02
116	54708,40	46157,05
117	53541,30	46000,89
118	52529,90	45897,95
119	52569,50	45819,77
120	53235,90	45825,30
121	52730,70	45782,88
122	52351,00	45764,45
123	51920,60	45719,67
124	51480,90	45693,38
125	50377,30	45585,90
126	49093,80	45402,65
127	48902,80	45311,48
128	48657,50	45202,54
129	45544,10	44611,77
130	44593,70	44245,47
131	42539,50	43529,65

Result			
No	d_t	y_t	
132	45010,70	43881,76	
133	45497,20	43742,17	
134	43706,70	43162,96	
135	44572,70	43501,12	
136	44304,40	43329,15	
137	42697,60	43103,38	
138	44452,10	43420,99	
139	45719,90	43717,68	
140	44350,80	43624,16	
141	43317,50	43260,17	
142	41866,40	42499,46	
143	41957,90	42718,29	
144	41342,80	42342,66	
145	43539,90	42616,44	
146	44752,50	43045,21	

Result			
No	d_t	y_t	
147	45493,70	43302,24	
148	44305,30	43065,84	
149	45741,70	43572,93	
150	46249,30	44061,91	
151	45876,70	44088,74	
152	46446,60	44345,91	
153	45592,50	44154,80	
154	44895,00	44114,14	
155	45524,50	44041,68	
156	46260,30	44132,70	
157	45823,30	44160,44	
158	44776,90	43892,84	
159	43343,60	43427,00	
160	42923,00	43296,92	

APPENDIX_L

GARCH-DAN2 RESULTS FOR TRAINING AND TEST

Training Result No	d_t	y_t	Training Result No	d_t	y_t
1	10161,20	9899,80	36	10815,50	10624,16
2	10225,80	10285,16	37	10841,80	10823,40
3	10204,10	10331,60	38	10961,30	10859,76
4	10412,70	10290,69	39	10817,50	11005,86
5	10124,90	10520,45	40	10744,70	10864,99
6	10280,70	10218,30	41	10614,10	10784,11
7	10467,90	10360,74	42	10666,60	10648,81
8	10348,30	10550,93	43	10604,30	10710,72
9	10590,30	10412,37	44	9482,92	10651,27
10	10570,40	10666,99	45	10581,50	9698,38
11	10544,70	10633,49	46	9938,21	10845,22
12	10881,90	10599,02	47	9644,31	10009,79
13	10825,90	10963,08	48	9406,56	9630,38
14	10931,10	10874,99	49	8892,65	9395,22
15	10742,90	10977,61	50	9187,88	8934,59
16	10725,70	10797,23	51	9408,46	9222,90
17	10945,70	10770,85	52	9572,25	9456,73
18	11032,00	11008,22	53	9631,43	9602,73
19	11122,00	11081,41	54	9475,09	9665,66
20	10658,30	11165,75	55	9773,83	9518,93
21	10659,90	10716,53	56	9804,88	9841,38
22	10921,80	10678,43	57	10153,20	9847,74
23	11013,80	10974,48	58	10415,00	10210,78
24	11302,50	11058,05	59	10743,00	10460,59
25	11775,50	11353,06	60	10512,90	10784,37
26	11607,30	11845,32	61	10886,20	10545,14
27	11669,30	11630,46	62	10629,70	10949,63
28	11754,00	11699,75	63	10565,90	10675,92
29	11392,60	11805,62	64	11103,40	10593,31
30	11272,70	11439,46	65	11169,00	11200,56
31	11291,90	11292,22	66	11366,00	11199,20
32	11486,80	11319,69	67	11219,20	11393,64
33	11574,40	11544,02	68	11254,00	11262,59
34	10128,90	11619,93	69	11504,70	11296,89
35	10616,10	10444,09	70	11405,20	11564,67

Result			
No	d_t	y_t	
71	11119,60	11446,80	
72	11341,40	11155,58	
73	11311,10	11387,90	
74	11436,20	11354,93	
75	11510,00	11481,20	
76	11467,60	11559,78	
77	11300,70	11511,89	
78	11112,10	11342,20	
79	10962,90	11141,54	
80	10676,30	10986,66	
81	10783,90	10701,84	
82	10640,40	10816,07	
83	10712,90	10678,96	
84	10590,70	10761,04	
85	10393,30	10635,51	
86	10229,40	10429,60	
87	10306,30	10253,81	
88	10427,00	10342,99	
89	10540,90	10480,12	
90	10695,20	10587,68	
91	11056,30	10741,66	
92	11125,30	11117,25	
93	11088,90	11155,75	
94	11437,40	11119,14	
95	11407,10	11503,84	
96	11381,40	11445,81	
97	11579,30	11414,80	
98	11346,50	11636,57	
99	11084,70	11393,25	
100	11129,70	11112,94	
101	10973,40	11154,76	
102	10827,80	11009,46	
103	10644,70	10861,91	
104	10597,30	10671,66	
105	10489,20	10626,43	
106	10713,90	10524,60	
107	11036,70	10773,18	
108	11169,20	11097,86	
109	11107,50	11200,04	
110	10902,50	11138,19	
111	10783,90	10942,26	
112	10747,50	10811,57	
113	10756,80	10779,62	
114	10740,20	10802,86	

Result			
No	d_t	y_t	
115	10927,80	10792,60	
116	10981,20	10984,69	
117	10884,40	11027,39	
118	10749,80	10925,61	
119	10690,90	10789,24	
120	10726,60	10725,91	
121	10502,90	10771,83	
122	10351,80	10546,61	
123	10546,90	10379,98	
124	10364,90	10594,82	
125	10399,70	10412,04	
126	10454,90	10441,30	
127	10658,80	10503,78	
128	10918,60	10713,94	
129	10791,40	10970,21	
130	10751,50	10824,98	
131	10856,90	10789,17	
132	10827,30	10908,17	
133	10544,50	10877,90	
134	10463,80	10586,65	
135	10475,20	10487,26	
136	10561,30	10508,45	
137	10598,30	10615,36	
138	10478,30	10648,55	
139	10445,00	10524,98	
140	10572,00	10487,98	
141	10621,20	10625,36	
142	11112,10	10670,94	
143	11499,90	11193,99	
144	11311,10	11550,58	
145	11547,40	11326,33	
146	11558,50	11592,12	
147	11762,30	11604,75	
148	11860,10	11809,10	
149	11916,10	11905,50	
150	11794,90	11956,28	
151	11877,50	11839,82	
152	11661,20	11927,28	
153	11688,90	11703,73	
154	11557,00	11728,37	
155	11845,90	11594,78	
156	12001,10	11907,61	
157	11798,00	12048,46	
158	11735,20	11832,59	

Result			
No	d_t	y_t	
159	11623,40	11770,43	
160	11509,00	11656,52	
161	11611,80	11544,47	
162	11652,80	11658,76	
163	11637,10	11703,68	
164	11671,80	11683,86	
165	11636,50	11724,04	
166	11631,80	11688,27	
167	11581,30	11682,84	
168	11946,70	11629,67	
169	12317,70	12015,24	
170	12507,00	12374,67	
171	12715,20	12533,94	
172	12662,50	12749,94	
173	13005,00	12698,70	
174	12958,20	13062,97	
175	13419,30	12998,40	
176	13663,50	13482,39	
177	13845,00	13706,95	
178	14031,10	13873,52	
179	13798,30	14071,44	
180	13935,70	13835,99	
181	13758,80	13979,82	
182	13255,90	13798,37	
183	13055,90	13286,86	
184	13444,00	13055,40	
185	13880,50	13496,69	
186	14210,20	13944,18	
187	15719,70	14245,00	
188	15482,70	15965,39	
189	15147,80	15475,83	
190	14907,00	15130,20	
191	15420,60	14916,29	
192	15064,80	15488,05	
193	15023,00	15104,90	
194	15382,20	15044,45	
195	15596,80	15439,77	
196	15381,90	15642,40	
197	15358,70	15410,73	
198	15595,30	15393,50	
199	15300,40	15647,85	
200	14829,50	15340,55	
201	14866,30	14849,12	
202	14564,80	14877,17	

Result			
No	d_t	y_t	
203	14673,40	14587,44	
204	15379,70	14710,75	
205	15754,30	15475,66	
206	16341,20	15794,58	
207	16268,30	16388,71	
208	16408,30	16287,95	
209	15536,80	16437,22	
210	15708,10	15587,54	
211	15528,60	15714,15	
212	15224,10	15543,87	
213	15771,40	15249,86	
214	16056,60	15842,69	
215	16080,70	16105,05	
216	15687,10	16101,98	
217	15760,50	15718,18	
218	15780,20	15788,54	
219	14617,50	15817,87	
220	16007,60	14703,77	
221	16242,00	16215,16	
222	16389,60	16272,77	
223	16271,90	16379,98	
224	16504,80	16306,75	
225	16913,30	16554,57	
226	16861,00	16972,86	
227	16614,70	16890,78	
228	16551,60	16641,08	
229	16955,20	16578,98	
230	17410,00	17015,59	
231	17208,50	17467,88	
232	17230,80	17230,86	
233	17742,40	17260,31	
234	18206,10	17810,38	
235	18387,60	18259,85	
236	18242,00	18413,30	
237	18239,90	18266,68	
238	17643,70	18277,40	
239	17996,80	17667,74	
240	17973,90	18033,57	
241	18292,90	18009,76	
242	18625,00	18338,21	
243	19147,70	18675,50	
244	19696,60	19200,88	
245	19013,80	19747,61	
246	19382,80	19039,06	

Result			
No	d_t	y_t	
247	19404,90	19415,88	
248	19926,50	19440,30	
249	19558,80	19981,59	
250	19460,30	19590,18	
251	18818,60	19478,17	
252	18952,20	18830,94	
253	18301,20	18966,44	
254	17788,60	18318,97	
255	18832,80	17781,89	
256	18899,90	18943,81	
257	18518,10	18932,81	
258	18356,50	18521,62	
259	17899,50	18372,25	
260	17902,00	17909,94	
261	17282,30	17917,11	
262	17259,30	17300,84	
263	17033,80	17266,36	
264	16965,80	17048,74	
265	17641,00	16994,77	
266	17418,50	17723,75	
267	18000,30	17449,67	
268	18885,90	18055,45	
269	19000,50	18981,58	
270	19324,50	19013,68	
271	19010,10	19349,87	
272	19478,70	19042,43	
273	18606,00	19532,37	
274	18603,80	18646,76	
275	18284,00	18602,67	
276	18497,70	18289,45	
277	18707,10	18538,23	
278	18771,60	18756,01	
279	18889,20	18808,44	
280	18786,40	18929,90	
281	19356,60	18825,90	
282	19171,90	19422,65	
283	19015,50	19205,43	
284	19165,70	19035,14	
285	19495,40	19206,11	
286	19488,50	19549,31	
287	19798,80	19523,24	
288	19381,40	19843,19	
289	19364,40	19414,09	
290	19526,50	19386,63	

Result			
No	d_t	y_t	
291	19321,60	19566,26	
292	19294,50	19358,47	
293	19611,10	19327,47	
294	20023,80	19663,76	
295	20167,20	20077,63	
296	20185,80	20199,46	
297	20347,80	20215,43	
298	20472,60	20391,33	
299	20836,10	20516,24	
300	20887,00	20885,37	
301	20030,70	20922,67	
302	20190,80	20054,49	
303	20322,20	20197,45	
304	20485,00	20352,82	
305	20330,90	20526,68	
306	20272,90	20365,45	
307	20040,10	20305,81	
308	19419,80	20065,36	
309	19505,20	19429,95	
310	19259,50	19514,53	
311	19104,40	19278,41	
312	18678,20	19128,14	
313	18687,50	18691,81	
314	19269,50	18705,06	
315	19935,70	19338,54	
316	19528,10	20002,34	
317	19270,40	19542,84	
318	19431,50	19278,97	
319	18586,50	19460,93	
320	18217,10	18616,85	
321	18229,70	18200,71	
322	17737,90	18230,12	
323	18022,70	17757,52	
324	17678,30	18059,66	
325	18244,70	17707,53	
326	18272,40	18308,69	
327	17624,10	18311,68	
328	17002,00	17648,20	
329	16807,70	16996,07	
330	17102,50	16789,33	
331	17144,70	17138,62	
332	16645,90	17188,77	
333	16531,30	16675,56	
334	15922,40	16541,78	

Result			
No	d _t	y _t	
335	16124,30	15937,04	
336	16334,20	16145,03	
337	16628,80	16378,22	
338	17167,40	16674,89	
339	16791,10	17227,81	
340	17235,50	16818,03	
341	17164,00	17284,39	
342	17327,90	17203,13	
343	17081,10	17363,58	
344	16766,80	17119,14	
345	16867,50	16786,88	
346	17044,40	16895,11	
347	17708,20	17092,53	
348	18020,30	17783,95	
349	17604,10	18057,46	
350	17615,60	17621,46	
351	17786,40	17640,07	
352	17664,50	17828,61	
353	17079,80	17705,12	
354	17230,50	17103,28	
355	17099,00	17248,63	
356	16901,40	17125,97	
357	16964,10	16931,40	
358	16785,40	16999,78	
359	16752,80	16820,44	
360	16820,00	16788,48	
361	16888,60	16863,48	
362	17355,20	16936,59	
363	17710,40	17417,26	
364	17735,50	17757,35	
365	17967,60	17759,82	
366	18290,30	18008,33	
367	18416,40	18341,15	
368	18554,80	18452,17	
369	18237,60	18591,55	
370	18296,70	18270,56	
371	18076,90	18329,17	
372	18327,10	18105,49	
373	18368,40	18375,07	
374	18493,00	18412,45	
375	18635,20	18533,03	
376	18966,20	18680,70	
377	19157,30	19016,12	
378	18945,00	19197,58	

Result			
No	d _t	y _t	
379	18881,30	18973,25	
380	18779,80	18912,11	
381	18628,70	18810,31	
382	18904,30	18658,69	
383	18645,40	18954,11	
384	18774,60	18682,06	
385	19018,60	18812,11	
386	19111,40	19069,25	
387	19380,90	19150,75	
388	19698,10	19425,23	
389	19427,40	19745,63	
390	19048,50	19455,56	
391	19344,30	19063,58	
392	19187,60	19381,18	
393	19248,10	19223,25	
394	19392,60	19284,07	
395	18908,60	19439,97	
396	18775,50	18938,04	
397	18826,00	18787,49	
398	18832,20	18852,38	
399	19459,70	18875,75	
400	19268,10	19530,68	
401	19187,80	19298,37	
402	19286,30	19207,59	
403	19363,70	19327,06	
404	19663,60	19409,59	
405	19558,00	19713,02	
406	19572,30	19593,57	
407	19855,30	19606,87	
408	20218,40	19907,08	
409	20512,20	20269,23	
410	20525,90	20552,02	
411	20775,00	20555,09	
412	20851,60	20816,97	
413	21119,20	20892,45	
414	21468,30	21162,39	
415	21398,00	21516,56	
416	21004,10	21427,32	
417	21060,20	21023,66	
418	21705,30	21083,67	
419	21616,50	21775,22	
420	21704,80	21646,07	
421	20833,20	21729,49	
422	20373,40	20854,61	

Result

No	d _t	y _t
423	21192,90	20352,54
424	21491,40	21259,71
425	22276,70	21537,03
426	22307,40	22334,19
427	22083,00	22331,58
428	22293,80	22095,08
429	22219,90	22335,51
430	21953,50	22257,71
431	21722,50	21977,62
432	21987,70	21737,48
433	21612,50	22027,50
434	22287,10	21641,38
435	22432,20	22350,87
436	22951,40	22473,00
437	22787,30	22994,08
438	22289,90	22815,32
439	22630,00	22300,59
440	22318,90	22664,23
441	22477,10	22345,85
442	22334,30	22510,40
443	22550,90	22366,49
444	22220,80	22593,69
445	22201,50	22250,24
446	22244,00	22226,48
447	21907,80	22278,19
448	22142,50	21933,29
449	22565,80	22180,91
450	22899,90	22621,29
451	22857,90	22941,28
452	23215,60	22883,15
453	23437,80	23259,53
454	23006,50	23480,89
455	23215,60	23027,30
456	22616,00	23247,87
457	22544,30	22633,28
458	22618,00	22552,61
459	22186,90	22644,10
460	22104,70	22209,31
461	22566,40	22120,14
462	23132,60	22619,64
463	23176,70	23191,59
464	22931,40	23200,35
465	23472,40	22949,24
466	23516,30	23529,15

Result

No	d _t	y _t
467	23464,50	23554,31
468	23293,20	23487,50
469	22799,20	23321,75
470	22486,20	22808,90
471	22560,90	22484,16
472	23150,10	22579,21
473	23008,10	23214,03
474	23049,50	23036,95
475	23075,60	23073,59
476	22625,40	23115,48
477	22679,90	22645,71
478	22943,70	22701,05
479	23634,80	22987,90
480	23417,90	23700,86
481	23289,70	23440,12
482	23935,20	23304,27
483	24360,60	23999,76
484	24341,40	24409,75
485	24044,60	24360,03
486	24525,30	24063,23
487	24430,80	24576,12
488	24537,70	24465,60
489	24590,80	24566,74
490	24935,80	24631,20
491	24971,70	24982,23
492	25445,20	25006,86
493	25042,00	25492,17
494	24422,90	25067,11
495	24561,90	24420,15
496	25308,30	24571,10
497	25604,70	25378,52
498	26110,20	25642,15
499	26271,30	26147,73
500	26493,00	26302,88
501	26362,70	26524,10
502	26863,20	26391,44
503	26813,10	26912,29
504	26918,10	26846,09
505	26469,40	26945,14
506	26860,00	26486,83
507	27056,00	26898,47
508	27302,70	27097,84
509	27074,10	27336,90
510	27330,40	27098,72

Result			
No	d _t	y _t	
511	27849,80	27367,16	
512	27936,50	27904,12	
513	27554,80	27965,89	
514	27813,20	27567,08	
515	28201,70	27845,96	
516	28269,70	28250,11	
517	27528,10	28299,24	
518	27308,80	27533,74	
519	27736,30	27299,88	
520	28003,60	27772,04	
521	28164,10	28046,74	
522	27661,60	28193,59	
523	27000,40	27675,86	
524	27293,20	26988,10	
525	26864,30	27307,55	
526	26657,40	26878,83	
527	26921,30	26665,34	
528	27354,60	26954,53	
529	28031,50	27405,34	
530	28396,20	28086,75	
531	27768,50	28430,87	
532	27226,40	27775,00	
533	27558,90	27212,83	
534	27663,20	27578,45	
535	27789,90	27699,91	
536	27698,30	27821,32	
537	27746,40	27728,56	
538	27519,80	27779,70	
539	27572,80	27543,63	
540	26936,80	27601,52	
541	26547,20	26944,05	
542	25331,70	26536,52	
543	24476,00	25315,31	
544	25348,50	24425,27	
545	24636,70	25389,82	
546	25218,20	24659,37	
547	24439,30	25254,18	
548	25068,50	24458,12	
549	25502,60	25111,30	
550	24842,20	25554,97	
551	24479,70	24853,73	
552	24600,90	24472,81	
553	25557,80	24615,23	
554	25740,80	25644,14	

Result			
No	d _t	y _t	
555	25445,10	25772,06	
556	25682,50	25450,18	
557	26056,60	25719,29	
558	25831,20	26106,39	
559	25786,50	25855,57	
560	25370,30	25809,73	
561	25078,00	25382,53	
562	25293,20	25081,17	
563	24542,00	25321,53	
564	23853,30	24555,98	
565	23285,90	23833,76	
566	24143,90	23256,59	
567	24175,90	24207,76	
568	24419,40	24212,10	
569	24730,80	24442,97	
570	24798,10	24776,22	
571	24484,00	24830,39	
572	24070,10	24505,34	
573	23519,60	24075,62	
574	23591,60	23511,74	
575	24253,00	23600,00	
576	24137,90	24318,66	
577	24560,20	24165,94	
578	25099,90	24597,83	
579	24950,80	25156,27	
580	24702,20	24971,44	
581	24688,30	24716,91	
582	24662,90	24711,72	
583	25114,40	24694,21	
584	25325,70	25166,78	
585	24921,30	25366,08	
586	24846,10	24938,20	
587	25205,50	24862,71	
588	25464,90	25250,44	
589	24329,10	25508,48	
590	24140,90	24346,98	
591	24119,80	24116,88	
592	24054,10	24122,23	
593	24453,10	24085,08	
594	24977,80	24503,77	
595	25236,50	25033,00	
596	25230,80	25269,32	
597	25799,10	25254,06	
598	26051,60	25852,45	

Result			
No	d _t	y _t	
599	25533,10	26091,62	
600	25478,00	25545,20	
601	25779,80	25490,01	
602	25500,00	25819,39	
603	25725,20	25528,52	
604	25610,00	25760,24	
605	25929,90	25642,55	
606	26209,40	25972,12	
607	26579,70	26253,96	
608	26529,30	26620,36	
609	26709,20	26556,23	
610	26746,40	26742,41	
611	26779,30	26783,52	
612	27021,50	26812,60	
613	27033,40	27063,50	
614	26597,80	27067,80	
615	26811,40	26612,59	
616	27135,90	26839,65	
617	26957,30	27181,98	
618	27616,90	26982,64	
619	27702,30	27671,49	
620	27377,60	27737,69	
621	27781,40	27388,24	
622	27689,50	27823,50	
623	27842,40	27721,94	
624	27808,10	27872,76	
625	27689,20	27842,65	
626	28061,90	27716,02	
627	28500,90	28106,90	
628	28427,30	28549,74	
629	28402,70	28450,10	
630	28675,40	28425,61	
631	28713,50	28717,33	
632	28992,10	28747,83	
633	29188,10	29029,24	
634	29273,30	29225,74	
635	28730,70	29303,27	
636	29164,80	28741,37	
637	29343,00	29199,83	
638	29615,30	29382,16	
639	29776,70	29648,12	
640	29543,50	29810,40	
641	29727,10	29563,91	
642	30123,60	29759,57	

Result			
No	d _t	y _t	
643	29945,40	30170,17	
644	29924,80	29968,63	
645	29701,00	29946,10	
646	29683,20	29718,97	
647	29111,80	29705,56	
648	28175,90	29115,51	
649	28074,90	28152,59	
650	28257,70	28053,26	
651	27906,30	28278,57	
652	28000,00	27927,77	
653	28456,90	28025,42	
654	28951,40	28507,06	
655	29191,60	28999,12	
656	29372,20	29221,72	
657	29814,20	29400,33	
658	30020,40	29857,51	
659	30015,10	30054,53	
660	30908,00	30038,09	
661	31948,00	30973,97	
662	31701,60	32024,01	
663	31879,50	31706,21	
664	31832,50	31892,14	
665	31385,00	31861,53	
666	31485,40	31392,28	
667	32202,70	31502,30	
668	32711,10	32261,44	
669	32541,10	32755,77	
670	32632,40	32551,81	
671	33271,10	32653,47	
672	33294,30	33324,15	
673	33221,20	33321,19	
674	33719,30	33234,83	
675	33863,80	33763,27	
676	33465,60	33896,71	
677	33250,50	33472,60	
678	33516,00	33253,40	
679	33319,20	33544,07	
680	32745,00	33342,18	
681	33396,20	32740,81	
682	33333,20	33436,38	
683	34300,90	33361,96	
684	35624,80	34359,61	
685	34775,70	35715,79	
686	33510,40	34769,28	

Result			
No	d _t	y _t	
687	33413,60	33464,80	
688	33506,00	33374,41	
689	34040,20	33513,87	
690	33118,40	34087,31	
691	32054,30	33122,00	
692	31440,00	32012,18	
693	31850,70	31388,22	
694	31586,80	31862,46	
695	30766,70	31606,72	
696	31403,90	30755,30	
697	31428,60	31435,74	
698	31845,70	31459,94	
699	31670,00	31878,63	
700	31474,40	31694,36	
701	31273,30	31486,74	
702	31038,50	31283,89	
703	31964,00	31047,17	
704	32792,00	32031,24	
705	33152,10	32856,46	
706	33830,10	33175,58	
707	33749,40	33870,65	
708	33848,30	33768,52	
709	34709,70	33865,89	
710	34096,30	34771,69	
711	34171,50	34106,84	
712	34324,00	34175,82	
713	34866,60	34351,14	
714	35127,30	34911,81	
715	35314,30	35160,18	
716	35655,00	35338,01	
717	35254,10	35688,96	
718	36179,30	35265,79	
719	36907,80	36234,48	
720	36759,90	36964,93	
721	36621,50	36765,43	
722	37495,20	36626,55	
723	38088,70	37552,28	
724	38296,90	38136,22	
725	38573,70	38314,15	
726	39130,70	38597,34	
727	38917,80	39171,08	
728	38441,60	38930,93	
729	38587,80	38433,14	
730	37496,20	38598,10	

Result			
No	d _t	y _t	
731	38202,20	37476,42	
732	37741,70	38224,60	
733	37870,60	37749,21	
734	37631,60	37880,19	
735	37716,70	37641,97	
736	37960,10	37736,65	
737	37729,40	37992,42	
738	38210,20	37745,09	
739	38353,10	38244,74	
740	38919,50	38383,62	
741	39139,10	38956,21	
742	39015,90	39167,76	
743	39220,20	39025,83	
744	39837,30	39245,03	
745	39777,70	39882,53	
746	39790,70	39795,86	
747	40665,40	39801,70	
748	41362,50	40719,59	
749	41722,40	41410,66	
750	41905,40	41744,04	
751	43628,80	41921,93	
752	44076,90	43725,77	
753	42622,90	44112,31	
754	43645,20	42582,02	
755	44465,70	43669,91	
756	43851,40	44523,11	
757	44434,50	43839,13	
758	45746,20	44453,93	
759	45784,10	45824,05	
760	45315,20	45797,86	
761	44891,30	45294,38	
762	44590,20	44870,51	
763	45250,70	44572,61	
764	44841,00	45284,05	
765	44228,00	44847,89	
766	44855,60	44201,99	
767	44653,00	44878,84	
768	43842,70	44666,58	
769	44117,50	43815,51	
770	44772,90	44117,58	
771	44046,30	44815,37	
772	43507,50	44039,86	
773	43804,00	43475,46	
774	45361,30	43809,40	

Result

No	d _t	y _t
775	46244,30	45451,45
776	46689,00	46296,42
777	46710,90	46702,17
778	46265,40	46715,72
779	46553,60	46256,25
780	46838,10	46566,58
781	47728,50	46864,66
782	47015,90	47774,30
783	47493,00	47008,33
784	46890,80	47501,83
785	46366,20	46883,01
786	45997,10	46336,20
787	43889,80	45970,45
788	42340,40	43823,01
789	42863,40	42226,20
790	42521,90	42830,90
791	44346,00	42519,69
792	42906,70	44442,46
793	43236,70	42901,12
794	44051,30	43214,76
795	44688,10	44098,79
796	44426,30	44727,29
797	44399,40	44425,57
798	44328,80	44401,48
799	44531,20	44338,37
800	43273,90	44553,31
801	42710,50	43244,52
802	41742,10	42658,27
803	42507,00	41688,25
804	42941,70	42527,36
805	42911,30	42981,36
806	44028,40	42918,88
807	44070,90	44085,81
808	44088,60	44092,63
809	43710,60	44088,50
810	44284,20	43709,32
811	43099,30	44314,50
812	42890,30	43080,74
813	42505,00	42857,33
814	41919,30	42484,12
815	42212,00	41895,59
816	41860,70	42220,91
817	42864,90	41864,99
818	43732,50	42916,17

Result

No	d _t	y _t
819	43872,80	43790,32
820	45075,90	43883,66
821	45278,40	45132,60
822	45352,50	45303,26
823	44745,50	45353,46
824	43752,00	44734,07
825	43880,40	43705,40
826	44030,40	43862,37
827	44413,60	44045,25
828	44647,80	44442,58
829	44251,40	44671,94
830	44212,80	44250,18
831	44712,90	44214,47
832	44563,30	44745,50
833	43599,00	44577,03
834	43713,20	43568,69
835	41970,80	43699,97
836	40268,70	41924,96
837	41044,10	40171,66
838	40439,20	41027,09
839	39643,70	40433,53
840	36351,10	39609,62
841	37235,50	36320,31
842	36100,70	37179,03
843	36730,20	36066,34
844	38593,50	36746,86
845	38908,60	38724,72
846	37860,80	38933,71
847	38132,20	37827,71
848	38395,20	38131,37
849	39285,80	38422,64
850	37964,00	39340,73
851	37464,40	37956,14
852	36709,60	37418,08
853	35338,70	36667,31
854	34802,60	35285,70
855	34330,30	34742,42
856	32384,40	34296,13
857	32899,70	32351,06
858	33627,40	32873,30
859	34048,00	33676,57
860	34807,70	34081,56
861	34601,40	34853,65
862	33762,00	34615,49

Result

No	d _t	y _t
863	34229,00	33745,72
864	33132,30	34246,97
865	31950,60	33125,93
866	32470,40	31900,16
867	33207,10	32466,74
868	34031,10	33266,31
869	35453,30	34084,40
870	35456,50	35541,07
871	36481,20	35467,99
872	35385,00	36527,57
873	35698,70	35388,11
874	36202,20	35698,38
875	36148,40	36243,49
876	35955,80	36167,81
877	35815,50	35964,89
878	35010,50	35826,58
879	33831,70	34995,20
880	32702,90	33785,22
881	33618,00	32637,12
882	33554,40	33643,90
883	35311,00	33581,39
884	34988,80	35422,56
885	34959,00	35004,71
886	35264,40	34946,50
887	35984,50	35299,18
888	36747,30	36038,09
889	36101,90	36798,50
890	36067,90	36100,16
891	35742,80	36066,20
892	35721,60	35742,94
893	35262,90	35733,74
894	36159,60	35262,82
895	35967,50	36214,36
896	36535,70	35990,95
897	37563,30	36565,75
898	37389,30	37633,41
899	37418,10	37400,16
900	37631,10	37422,64
901	37806,50	37662,21
902	38433,40	37836,13
903	37885,30	38477,07
904	37384,80	37891,62
905	37164,90	37366,03
906	37130,80	37152,90

Result

No	d _t	y _t
907	37121,80	37138,83
908	36651,40	37142,05
909	36861,70	36652,48
910	36686,70	36879,23
911	36897,20	36702,97
912	37285,90	36924,05
913	37414,90	37325,00
914	38139,10	37440,84
915	38180,00	38185,01
916	37689,70	38203,52
917	37457,00	37684,50
918	37372,00	37451,05
919	37172,60	37377,04
920	37624,50	37181,36
921	37774,60	37660,79
922	37478,70	37805,64
923	38143,90	37485,94
924	38245,90	38186,40
925	38345,10	38275,72
926	38275,00	38360,68
927	37790,80	38295,17
928	36390,00	37788,55
929	36084,20	36347,94
930	36432,40	36034,55
931	36818,70	36443,56
932	37268,20	36859,28
933	36924,90	37303,95
934	36983,90	36934,05
935	36830,40	36997,54
936	36389,70	36845,07
937	36917,40	36387,96
938	36737,60	36951,27
939	36885,90	36759,27
940	37449,20	36904,93
941	37660,40	37494,68
942	38316,90	37689,79
943	38486,10	38357,16
944	38998,00	38512,55
945	38456,80	39029,59
946	39743,80	38462,09
947	39823,90	39811,47
948	39643,80	39854,03
949	40591,10	39637,15
950	40683,30	40646,16

Result			
No	d _t	y _t	
951	40081,40	40710,23	
952	40582,30	40067,67	
953	40601,70	40607,02	
954	39504,10	40625,86	
955	39307,10	39480,08	
956	39675,90	39277,65	
957	40163,70	39694,31	
958	39736,70	40204,59	
959	39890,90	39741,24	
960	39627,20	39903,44	
961	39030,30	39635,72	
962	39655,10	39015,65	
963	39654,10	39685,42	
964	39268,10	39679,55	
965	38432,80	39265,75	
966	38346,60	38404,98	
967	38501,10	38329,33	
968	37733,60	38516,66	
969	38077,10	37726,28	
970	37582,10	38090,30	
971	38238,60	37583,89	
972	37183,80	38275,63	
973	38066,90	37179,39	
974	38168,50	38101,21	
975	38196,50	38198,98	
976	37654,70	38205,54	
977	38163,00	37653,10	
978	38184,80	38192,37	
979	39857,80	38211,62	
980	39320,50	39956,52	
981	39461,90	39329,31	
982	39213,00	39453,21	
983	38874,90	39220,70	
984	39595,40	38872,27	
985	40204,80	39638,35	
986	39832,50	40252,81	
987	39071,10	39833,40	
988	38996,70	39046,56	
989	39083,00	38982,62	
990	39180,20	39096,27	
991	38705,40	39206,72	
992	38766,60	38707,35	
993	38610,60	38775,21	
994	39138,20	38621,53	

Result			
No	d _t	y _t	
995	39117,50	39176,20	
996	39006,30	39141,56	
997	38435,20	39015,53	
998	37832,10	38426,67	
999	37083,10	37805,60	
1000	36629,90	37046,37	
1001	37640,40	36598,11	
1002	38138,20	37696,10	
1003	39043,00	38184,29	
1004	38888,50	39088,86	
1005	39218,10	38900,26	
1006	40256,30	39235,65	
1007	40201,10	40322,26	
1008	41247,00	40217,62	
1009	41250,10	41295,71	
1010	42035,50	41272,57	
1011	42122,70	42070,06	
1012	41846,40	42146,42	
1013	41397,40	41843,91	
1014	41357,50	41385,93	
1015	41182,60	41356,25	
1016	42302,00	41187,36	
1017	43112,50	42364,54	
1018	42700,50	43166,98	
1019	42501,40	42692,69	
1020	42099,00	42492,69	
1021	41645,20	42087,52	
1022	42185,50	41626,78	
1023	42025,90	42211,84	
1024	42551,60	42043,31	
1025	43256,30	42580,34	
1026	43813,70	43303,69	
1027	43636,20	43847,29	
1028	44252,90	43640,00	
1029	44061,50	44283,41	
1030	42888,60	44075,79	
1031	43829,10	42851,33	
1032	43591,70	43855,22	
1033	43736,80	43605,55	
1034	41774,00	43741,85	
1035	41431,00	41731,71	
1036	39588,20	41362,14	
1037	40550,30	39521,49	
1038	39729,40	40556,67	

Result			
No	d_t	y_t	
1039	40230,80	39720,75	
1040	40406,50	40244,43	
1041	41406,90	40435,32	
1042	42056,30	41461,87	
1043	41978,30	42100,20	
1044	41666,00	41981,96	
1045	40501,90	41662,41	
1046	41195,20	40463,52	
1047	41819,80	41207,96	
1048	41922,20	41867,41	
1049	41817,70	41936,81	
1050	42419,40	41824,04	
1051	43239,80	42457,10	
1052	43408,70	43292,34	
1053	43263,60	43426,66	
1054	43097,10	43264,50	
1055	43079,50	43102,09	
1056	43666,20	43089,62	
1057	43661,10	43704,29	
1058	43542,20	43680,40	
1059	44309,30	43546,06	
1060	44660,70	44352,46	
1061	45714,10	44693,01	
1062	45845,20	45764,69	
1063	45889,20	45864,30	
1064	45339,80	45890,54	
1065	46105,80	45329,55	
1066	45566,10	46138,94	
1067	46044,20	45568,62	
1068	46697,10	46059,27	
1069	46621,50	46740,37	
1070	45634,00	46630,02	
1071	46308,10	45601,55	
1072	47355,80	46322,73	
1073	47014,90	47419,02	
1074	48032,70	47013,88	
1075	47826,10	48069,94	
1076	46861,30	47839,06	
1077	44984,50	46822,43	
1078	43529,50	44900,93	
1079	44256,10	43419,16	
1080	45077,70	44241,52	
1081	44818,10	45131,01	
1082	44681,10	44819,34	

Result			
No	d_t	y_t	
1083	44707,30	44675,83	
1084	45102,70	44717,58	
1085	45055,60	45132,37	
1086	44820,80	45071,31	
1087	45142,20	44821,18	
1088	44897,70	45164,30	
1089	45539,70	44907,18	
1090	45860,00	45572,03	
1091	46073,30	45890,68	
1092	46209,10	46088,43	
1093	46369,20	46225,43	
1094	46424,70	46387,30	
1095	46237,10	46440,37	
1096	46194,30	46242,63	
1097	46927,80	46200,80	
1098	47003,00	46968,15	
1099	46274,70	47022,70	
1100	47081,50	46252,89	
1101	46490,10	47110,98	
1102	46111,10	46489,65	
1103	46451,60	46086,86	
1104	45861,00	46463,83	
1105	44843,90	45854,19	
1106	44332,40	44796,76	
1107	44893,70	44283,79	
1108	44372,00	44909,87	
1109	44629,50	44373,42	
1110	44675,50	44638,96	
1111	45971,80	44693,88	
1112	46367,60	46038,68	
1113	46231,80	46400,32	
1114	46251,20	46224,78	
1115	45952,40	46259,03	
1116	45705,10	45951,80	
1117	45417,10	45697,69	
1118	46010,10	45407,24	
1119	45161,80	46040,83	
1120	46181,40	45151,78	
1121	47093,70	46218,45	
1122	47730,50	47153,19	
1123	48680,30	47759,16	
1124	49476,30	48722,73	
1125	49850,10	49515,93	
1126	49895,30	49866,89	

Result			
No	d_t	y_t	
1127	51281,90	49899,30	
1128	50557,60	51345,40	
1129	50055,50	50551,55	
1130	52005,80	50014,48	
1131	52086,70	52097,46	
1132	51774,40	52111,51	

Test			
Result			
No	d_t	y_t	
1	51643,80	51744,76	
2	51112,00	51635,95	
3	53325,30	51089,09	
4	52935,80	53430,33	
5	55625,40	52946,26	
6	54930,70	55739,72	
7	54831,90	54932,74	
8	52512,40	54787,24	
9	51561,90	52429,91	
10	51459,20	51450,57	
11	52824,90	51409,35	
12	51299,30	52887,17	
13	51393,60	51272,70	
14	50716,40	51356,00	
15	50429,90	50683,04	
16	50708,20	50403,33	
17	52070,60	50715,31	
18	49974,80	52138,59	
19	49186,40	49937,71	
20	50272,50	49094,69	
21	49880,90	50294,62	
22	47714,10	49887,34	
23	44473,30	47640,13	
24	46576,90	44347,59	
25	46148,80	46602,11	
26	45265,00	46156,07	
27	46882,00	45213,36	
28	47388,60	46954,10	
29	46824,00	47433,19	
30	47914,40	46799,27	
31	47750,70	47958,69	
32	48082,20	47766,49	
33	50198,60	48089,57	
34	49936,90	50314,17	

Result			
No	d_t	y_t	
35	50032,60	49944,89	
36	49421,40	50012,44	
37	49601,40	49403,98	
38	49050,40	49600,70	
39	48548,90	49035,55	
40	49296,20	48518,93	
41	49233,10	49323,25	
42	49680,50	49248,67	
43	50620,90	49697,21	
44	50536,50	50670,17	
45	50500,90	50543,35	
46	53884,10	50495,02	
47	53543,10	54081,60	
48	53882,10	53556,48	
49	53580,70	53850,51	
50	52893,20	53578,23	
51	54245,80	52858,72	
52	54390,20	54295,50	
53	54044,20	54413,31	
54	54198,00	54020,82	
55	54733,30	54200,26	
56	54164,90	54759,87	
57	54915,90	54152,46	
58	56793,00	54935,72	
59	56279,10	56888,49	
60	57910,60	56270,15	
61	57418,00	57956,99	
62	58053,40	57417,92	
63	58231,90	58053,77	
64	57185,40	58246,63	
65	57931,90	57142,33	
66	56268,20	57937,46	
67	55486,80	56216,67	
68	53969,80	55403,74	
69	55752,20	53877,08	
70	55638,90	55802,32	
71	55728,60	55656,36	
72	56446,60	55710,95	
73	56774,30	56477,20	
74	57615,70	56793,15	
75	57371,30	57645,29	
76	56855,10	57367,67	
77	56064,30	56822,72	
78	56906,00	56013,48	

Result

No	d_t	y_t
79	56076,40	56921,93
80	55160,80	56057,12
81	53689,10	55098,59
82	54084,00	53600,02
83	54719,00	54054,12
84	55664,90	54748,45
85	54743,00	55706,70
86	54304,50	54717,83
87	53262,90	54259,84
88	53577,80	53202,92
89	52615,60	53562,11
90	52199,30	52580,69
91	52331,30	52156,39
92	52682,50	52322,80
93	51452,30	52703,59
94	53202,80	51415,66
95	53181,20	53264,70
96	54213,80	53203,50
97	54320,00	54239,65
98	54013,30	54335,71
99	55521,20	53995,25
100	56186,90	55583,20
101	56490,60	56227,76
102	56518,60	56492,08
103	56271,30	56517,37
104	56766,20	56261,39
105	55239,00	56782,34
106	54911,70	55190,30
107	53603,40	54852,32
108	54223,60	53532,46
109	53847,40	54215,54
110	55510,50	53839,53
111	55380,70	55576,37
112	55373,20	55393,60
113	55233,00	55353,50
114	55698,40	55229,59
115	55538,10	55716,57
116	54708,40	55540,82
117	53541,30	54669,65
118	52529,90	53469,16
119	52569,50	52449,11
120	53235,90	52535,34

Result

No	d_t	y_t
121	52730,70	53264,49
122	52351,00	52724,24
123	51920,60	52323,89
124	51480,90	51891,84
125	50377,30	51451,52
126	49093,80	50321,78
127	48902,80	49012,15
128	48657,50	48851,44
129	45544,10	48637,66
130	44593,70	45474,56
131	42539,50	44457,56
132	45010,70	42433,17
133	45497,20	45121,94
134	43706,70	45549,31
135	44572,70	43650,87
136	44304,40	44575,47
137	42697,60	44308,99
138	44452,10	42647,67
139	45719,90	44520,14
140	44350,80	45806,11
141	43317,50	44316,29
142	41866,40	43246,39
143	41957,90	41783,58
144	41342,80	41917,75
145	43539,90	41320,05
146	44752,50	43666,43
147	45493,70	44833,22
148	44305,30	45512,12
149	45741,70	44276,66
150	46249,30	45795,59
151	45876,70	46294,57
152	46446,60	45861,01
153	45592,50	46471,13
154	44895,00	45581,04
155	45524,50	44851,09
156	46260,30	45539,95
157	45823,30	46309,14
158	44776,90	45819,49
159	43343,60	44733,60
160	42923,00	43266,96

APPENDIX_M

EGARCH-DAN2 RESULTS FOR TRAINING AND TEST

Training			Result		
Result			No	d_t	y_t
No	d_t	y_t			
1	10161,20	10257,71	37	10841,80	10913,15
2	10225,80	10176,08	38	10961,30	10881,96
3	10204,10	10222,77	39	10817,50	11007,51
4	10412,70	10211,54	40	10744,70	10868,90
5	10124,90	10448,69	41	10614,10	10789,91
6	10280,70	10162,04	42	10666,60	10653,46
7	10467,90	10321,41	43	10604,30	10715,84
8	10348,30	10517,52	44	9482,92	10657,80
9	10590,30	10391,10	45	10581,50	9533,30
10	10570,40	10637,22	46	9938,21	10661,89
11	10544,70	10621,80	47	9644,31	10019,64
12	10881,90	10589,89	48	9406,56	9685,15
13	10825,90	10931,74	49	8892,65	9467,37
14	10931,10	10871,32	50	9187,88	8937,45
15	10742,90	10972,25	51	9408,46	9226,97
16	10725,70	10791,61	52	9572,25	9458,46
17	10945,70	10771,01	53	9631,43	9618,63
18	11032,00	10997,80	54	9475,09	9674,07
19	11122,00	11080,75	55	9773,83	9520,69
20	10658,30	11165,98	56	9804,88	9822,59
21	10659,90	10686,64	57	10153,20	9854,03
22	10921,80	10688,34	58	10415,00	10198,58
23	11013,80	10967,38	59	10743,00	10465,88
24	11302,50	11060,59	60	10512,90	10799,48
25	11775,50	11346,73	61	10886,20	10549,41
26	11607,30	11831,75	62	10629,70	10928,15
27	11669,30	11646,55	63	10565,90	10672,80
28	11754,00	11704,94	64	11103,40	10599,83
29	11392,60	11809,71	65	11169,00	11153,03
30	11272,70	11426,79	66	11366,00	11217,26
31	11291,90	11300,23	67	11219,20	11407,71
32	11486,80	11328,99	68	11254,00	11265,97
33	11574,40	11541,19	69	11504,70	11302,52
34	10128,90	11623,03	70	11405,20	11557,48
35	10616,10	10184,80	71	11119,60	11451,51
36	10815,50	10705,71	72	11341,40	11150,67

Result			
No	d_t	y_t	
73	11311,10	11383,98	
74	11436,20	11361,04	
75	11510,00	11482,64	
76	11467,60	11564,11	
77	11300,70	11517,87	
78	11112,10	11345,23	
79	10962,90	11144,64	
80	10676,30	10994,05	
81	10783,90	10703,53	
82	10640,40	10821,09	
83	10712,90	10682,98	
84	10590,70	10765,71	
85	10393,30	10640,18	
86	10229,40	10430,12	
87	10306,30	10260,58	
88	10427,00	10347,96	
89	10540,90	10481,80	
90	10695,20	10589,48	
91	11056,30	10741,82	
92	11125,30	11104,13	
93	11088,90	11169,36	
94	11437,40	11126,81	
95	11407,10	11485,98	
96	11381,40	11452,64	
97	11579,30	11420,75	
98	11346,50	11634,38	
99	11084,70	11392,16	
100	11129,70	11111,76	
101	10973,40	11164,38	
102	10827,80	11013,33	
103	10644,70	10865,54	
104	10597,30	10676,53	
105	10489,20	10634,03	
106	10713,90	10529,93	
107	11036,70	10766,77	
108	11169,20	11086,06	
109	11107,50	11214,17	
110	10902,50	11145,80	
111	10783,90	10942,64	
112	10747,50	10817,92	
113	10756,80	10786,89	
114	10740,20	10809,30	
115	10927,80	10799,82	
116	10981,20	10982,01	

Result			
No	d_t	y_t	
117	10884,40	11031,86	
118	10749,80	10930,40	
119	10690,90	10793,34	
120	10726,60	10732,23	
121	10502,90	10777,59	
122	10351,80	10545,14	
123	10546,90	10384,62	
124	10364,90	10591,89	
125	10399,70	10413,23	
126	10454,90	10446,49	
127	10658,80	10509,00	
128	10918,60	10709,18	
129	10791,40	10965,62	
130	10751,50	10831,04	
131	10856,90	10795,02	
132	10827,30	10911,69	
133	10544,50	10885,02	
134	10463,80	10580,29	
135	10475,20	10495,90	
136	10561,30	10515,94	
137	10598,30	10619,84	
138	10478,30	10654,16	
139	10445,00	10529,84	
140	10572,00	10494,62	
141	10621,20	10627,27	
142	11112,10	10675,91	
143	11499,90	11161,14	
144	11311,10	11564,44	
145	11547,40	11350,57	
146	11558,50	11587,79	
147	11762,30	11610,61	
148	11860,10	11806,83	
149	11916,10	11908,79	
150	11794,90	11960,81	
151	11877,50	11845,12	
152	11661,20	11932,65	
153	11688,90	11704,34	
154	11557,00	11734,13	
155	11845,90	11599,40	
156	12001,10	11897,13	
157	11798,00	12050,01	
158	11735,20	11834,04	
159	11623,40	11776,40	
160	11509,00	11662,23	

Result			
No	d_t	y_t	
161	11611,80	11549,51	
162	11652,80	11662,37	
163	11637,10	11709,72	
164	11671,80	11690,35	
165	11636,50	11730,82	
166	11631,80	11695,55	
167	11581,30	11690,08	
168	11946,70	11637,10	
169	12317,70	11996,62	
170	12507,00	12369,77	
171	12715,20	12555,41	
172	12662,50	12757,56	
173	13005,00	12704,43	
174	12958,20	13051,04	
175	13419,30	13004,04	
176	13663,50	13464,09	
177	13845,00	13712,25	
178	14031,10	13886,37	
179	13798,30	14073,82	
180	13935,70	13836,65	
181	13758,80	13982,88	
182	13255,90	13802,17	
183	13055,90	13271,30	
184	13444,00	13076,56	
185	13880,50	13487,01	
186	14210,20	13933,60	
187	15719,70	14264,75	
188	15482,70	15889,06	
189	15147,80	15592,01	
190	14907,00	15174,29	
191	15420,60	14926,43	
192	15064,80	15467,60	
193	15023,00	15100,58	
194	15382,20	15050,37	
195	15596,80	15431,57	
196	15381,90	15643,46	
197	15358,70	15413,07	
198	15595,30	15399,76	
199	15300,40	15647,38	
200	14829,50	15339,74	
201	14866,30	14841,02	
202	14564,80	14891,72	
203	14673,40	14590,67	
204	15379,70	14714,73	

Result			
No	d_t	y_t	
205	15754,30	15435,41	
206	16341,20	15815,48	
207	16268,30	16411,33	
208	16408,30	16305,15	
209	15536,80	16441,67	
210	15708,10	15541,76	
211	15528,60	15728,21	
212	15224,10	15559,63	
213	15771,40	15248,82	
214	16056,60	15818,72	
215	16080,70	16106,86	
216	15687,10	16114,41	
217	15760,50	15712,19	
218	15780,20	15794,06	
219	14617,50	15823,80	
220	16007,60	14617,34	
221	16242,00	16069,53	
222	16389,60	16327,61	
223	16271,90	16454,03	
224	16504,80	16311,26	
225	16913,30	16554,75	
226	16861,00	16963,82	
227	16614,70	16897,11	
228	16551,60	16642,52	
229	16955,20	16585,21	
230	17410,00	17006,33	
231	17208,50	17460,91	
232	17230,80	17237,45	
233	17742,40	17265,09	
234	18206,10	17794,74	
235	18387,60	18258,04	
236	18242,00	18427,62	
237	18239,90	18270,77	
238	17643,70	18284,40	
239	17996,80	17654,49	
240	17973,90	18030,48	
241	18292,90	18015,73	
242	18625,00	18334,65	
243	19147,70	18672,51	
244	19696,60	19196,55	
245	19013,80	19751,24	
246	19382,80	19024,05	
247	19404,90	19412,55	
248	19926,50	19446,41	

Result			
No	d _t	y _t	
249	19558,80	19970,72	
250	19460,30	19588,08	
251	18818,60	19483,05	
252	18952,20	18822,66	
253	18301,20	18974,36	
254	17788,60	18310,48	
255	18832,80	17787,47	
256	18899,90	18888,24	
257	18518,10	18948,83	
258	18356,50	18529,16	
259	17899,50	18377,87	
260	17902,00	17910,67	
261	17282,30	17925,47	
262	17259,30	17291,43	
263	17033,80	17277,19	
264	16965,80	17057,60	
265	17641,00	17000,66	
266	17418,50	17693,86	
267	18000,30	17453,56	
268	18885,90	18041,04	
269	19000,50	18958,48	
270	19324,50	19055,18	
271	19010,10	19361,49	
272	19478,70	19042,40	
273	18606,00	19522,38	
274	18603,80	18613,03	
275	18284,00	18614,31	
276	18497,70	18303,56	
277	18707,10	18540,28	
278	18771,60	18757,46	
279	18889,20	18811,99	
280	18786,40	18933,25	
281	19356,60	18832,35	
282	19171,90	19405,72	
283	19015,50	19208,52	
284	19165,70	19038,93	
285	19495,40	19210,61	
286	19488,50	19546,37	
287	19798,80	19527,25	
288	19381,40	19840,83	
289	19364,40	19410,55	
290	19526,50	19392,24	
291	19321,60	19570,04	
292	19294,50	19363,24	

Result			
No	d _t	y _t	
293	19611,10	19334,09	
294	20023,80	19662,41	
295	20167,20	20072,09	
296	20185,80	20204,55	
297	20347,80	20219,38	
298	20472,60	20394,83	
299	20836,10	20520,16	
300	20887,00	20881,53	
301	20030,70	20926,24	
302	20190,80	20026,60	
303	20322,20	20207,21	
304	20485,00	20359,98	
305	20330,90	20528,83	
306	20272,90	20370,22	
307	20040,10	20312,61	
308	19419,80	20069,15	
309	19505,20	19421,00	
310	19259,50	19525,00	
311	19104,40	19283,84	
312	18678,20	19133,00	
313	18687,50	18690,91	
314	19269,50	18712,32	
315	19935,70	19321,67	
316	19528,10	19995,42	
317	19270,40	19548,80	
318	19431,50	19282,25	
319	18586,50	19465,86	
320	18217,10	18588,11	
321	18229,70	18217,45	
322	17737,90	18255,14	
323	18022,70	17752,36	
324	17678,30	18058,78	
325	18244,70	17707,16	
326	18272,40	18289,46	
327	17624,10	18316,78	
328	17002,00	17630,04	
329	16807,70	17001,76	
330	17102,50	16828,96	
331	17144,70	17140,84	
332	16645,90	17193,41	
333	16531,30	16664,21	
334	15922,40	16550,38	
335	16124,30	15933,37	
336	16334,20	16151,31	

Result			
No	d_t	y_t	
337	16628,80	16380,40	
338	17167,40	16672,80	
339	16791,10	17218,26	
340	17235,50	16817,08	
341	17164,00	17273,55	
342	17327,90	17208,39	
343	17081,10	17365,49	
344	16766,80	17122,12	
345	16867,50	16787,07	
346	17044,40	16900,84	
347	17708,20	17094,97	
348	18020,30	17760,86	
349	17604,10	18070,81	
350	17615,60	17621,34	
351	17786,40	17645,80	
352	17664,50	17831,81	
353	17079,80	17711,02	
354	17230,50	17088,86	
355	17099,00	17256,05	
356	16901,40	17132,52	
357	16964,10	16935,15	
358	16785,40	17005,36	
359	16752,80	16825,01	
360	16820,00	16795,17	
361	16888,60	16869,63	
362	17355,20	16942,95	
363	17710,40	17404,19	
364	17735,50	17758,23	
365	17967,60	17769,17	
366	18290,30	18008,35	
367	18416,40	18337,84	
368	18554,80	18456,04	
369	18237,60	18594,17	
370	18296,70	18270,79	
371	18076,90	18334,87	
372	18327,10	18109,20	
373	18368,40	18376,11	
374	18493,00	18417,80	
375	18635,20	18536,00	
376	18966,20	18684,04	
377	19157,30	19012,49	
378	18945,00	19199,56	
379	18881,30	18975,56	
380	18779,80	18918,47	

Result			
No	d_t	y_t	
381	18628,70	18816,30	
382	18904,30	18664,11	
383	18645,40	18954,45	
384	18774,60	18684,63	
385	19018,60	18816,30	
386	19111,40	19070,02	
387	19380,90	19153,99	
388	19698,10	19424,14	
389	19427,40	19743,54	
390	19048,50	19456,42	
391	19344,30	19062,36	
392	19187,60	19381,46	
393	19248,10	19227,92	
394	19392,60	19289,23	
395	18908,60	19444,87	
396	18775,50	18930,91	
397	18826,00	18793,80	
398	18832,20	18859,09	
399	19459,70	18883,13	
400	19268,10	19510,34	
401	19187,80	19301,98	
402	19286,30	19212,16	
403	19363,70	19332,91	
404	19663,60	19415,87	
405	19558,00	19711,06	
406	19572,30	19597,81	
407	19855,30	19612,41	
408	20218,40	19907,25	
409	20512,20	20265,50	
410	20525,90	20553,52	
411	20775,00	20559,38	
412	20851,60	20817,09	
413	21119,20	20896,54	
414	21468,30	21161,93	
415	21398,00	21513,90	
416	21004,10	21431,00	
417	21060,20	21022,09	
418	21705,30	21089,46	
419	21616,50	21758,79	
420	21704,80	21650,60	
421	20833,20	21732,92	
422	20373,40	20829,33	
423	21192,90	20367,34	
424	21491,40	21240,72	

Result			
No	d _t	y _t	
425	22276,70	21541,36	
426	22307,40	22335,08	
427	22083,00	22343,21	
428	22293,80	22098,39	
429	22219,90	22339,89	
430	21953,50	22264,23	
431	21722,50	21980,77	
432	21987,70	21741,67	
433	21612,50	22029,36	
434	22287,10	21641,24	
435	22432,20	22332,79	
436	22951,40	22476,56	
437	22787,30	22991,72	
438	22289,90	22818,14	
439	22630,00	22296,07	
440	22318,90	22664,50	
441	22477,10	22347,73	
442	22334,30	22514,23	
443	22550,90	22372,10	
444	22220,80	22597,12	
445	22201,50	22252,06	
446	22244,00	22232,40	
447	21907,80	22284,13	
448	22142,50	21934,82	
449	22565,80	22183,88	
450	22899,90	22616,70	
451	22857,90	22941,58	
452	23215,60	22886,95	
453	23437,80	23257,13	
454	23006,50	23482,05	
455	23215,60	23024,52	
456	22616,00	23251,35	
457	22544,30	22626,15	
458	22618,00	22558,86	
459	22186,90	22650,12	
460	22104,70	22207,55	
461	22566,40	22125,88	
462	23132,60	22614,35	
463	23176,70	23183,72	
464	22931,40	23207,89	
465	23472,40	22951,07	
466	23516,30	23520,73	
467	23464,50	23557,89	
468	23293,20	23490,94	

Result			
No	d _t	y _t	
469	22799,20	23327,86	
470	22486,20	22806,19	
471	22560,90	22490,68	
472	23150,10	22586,32	
473	23008,10	23202,44	
474	23049,50	23039,91	
475	23075,60	23077,17	
476	22625,40	23122,92	
477	22679,90	22643,51	
478	22943,70	22706,65	
479	23634,80	22989,69	
480	23417,90	23686,37	
481	23289,70	23443,73	
482	23935,20	23307,92	
483	24360,60	23986,66	
484	24341,40	24408,74	
485	24044,60	24366,27	
486	24525,30	24064,93	
487	24430,80	24571,85	
488	24537,70	24469,82	
489	24590,80	24569,85	
490	24935,80	24638,06	
491	24971,70	24981,29	
492	25445,20	25010,36	
493	25042,00	25486,94	
494	24422,90	25065,95	
495	24561,90	24414,29	
496	25308,30	24579,72	
497	25604,70	25363,13	
498	26110,20	25646,43	
499	26271,30	26148,99	
500	26493,00	26305,63	
501	26362,70	26525,27	
502	26863,20	26395,86	
503	26813,10	26907,52	
504	26918,10	26849,58	
505	26469,40	26948,01	
506	26860,00	26486,56	
507	27056,00	26898,67	
508	27302,70	27100,54	
509	27074,10	27337,37	
510	27330,40	27101,79	
511	27849,80	27370,42	
512	27936,50	27899,09	

Result			
No	d_t	y_t	
513	27554,80	27968,21	
514	27813,20	27566,72	
515	28201,70	27849,83	
516	28269,70	28249,40	
517	27528,10	28301,40	
518	27308,80	27523,10	
519	27736,30	27306,93	
520	28003,60	27772,72	
521	28164,10	28047,45	
522	27661,60	28195,07	
523	27000,40	27673,42	
524	27293,20	26984,67	
525	26864,30	27313,69	
526	26657,40	26879,37	
527	26921,30	26669,41	
528	27354,60	26957,60	
529	28031,50	27402,52	
530	28396,20	28079,46	
531	27768,50	28434,89	
532	27226,40	27767,97	
533	27558,90	27212,80	
534	27663,20	27583,50	
535	27789,90	27704,10	
536	27698,30	27823,91	
537	27746,40	27734,53	
538	27519,80	27786,67	
539	27572,80	27548,96	
540	26936,80	27608,26	
541	26547,20	26938,34	
542	25331,70	26540,95	
543	24476,00	25304,22	
544	25348,50	24459,34	
545	24636,70	25391,98	
546	25218,20	24649,59	
547	24439,30	25246,24	
548	25068,50	24445,15	
549	25502,60	25100,84	
550	24842,20	25553,67	
551	24479,70	24844,18	
552	24600,90	24476,23	
553	25557,80	24623,65	
554	25740,80	25616,90	
555	25445,10	25781,42	
556	25682,50	25453,28	

Result			
No	d_t	y_t	
557	26056,60	25723,26	
558	25831,20	26105,30	
559	25786,50	25857,42	
560	25370,30	25815,16	
561	25078,00	25383,02	
562	25293,20	25085,16	
563	24542,00	25325,45	
564	23853,30	24543,27	
565	23285,90	23834,22	
566	24143,90	23281,74	
567	24175,90	24188,63	
568	24419,40	24216,92	
569	24730,80	24446,41	
570	24798,10	24775,59	
571	24484,00	24833,21	
572	24070,10	24507,05	
573	23519,60	24076,13	
574	23591,60	23514,38	
575	24253,00	23609,13	
576	24137,90	24305,69	
577	24560,20	24169,16	
578	25099,90	24594,58	
579	24950,80	25149,66	
580	24702,20	24974,92	
581	24688,30	24719,38	
582	24662,90	24717,86	
583	25114,40	24700,79	
584	25325,70	25162,99	
585	24921,30	25367,31	
586	24846,10	24936,57	
587	25205,50	24868,30	
588	25464,90	25250,65	
589	24329,10	25509,00	
590	24140,90	24310,65	
591	24119,80	24133,55	
592	24054,10	24140,05	
593	24453,10	24091,63	
594	24977,80	24501,85	
595	25236,50	25026,58	
596	25230,80	25273,05	
597	25799,10	25257,26	
598	26051,60	25844,09	
599	25533,10	26092,78	
600	25478,00	25540,48	

Result			
No	d _t	y _t	
601	25779,80	25495,56	
602	25500,00	25821,30	
603	25725,20	25531,72	
604	25610,00	25763,56	
605	25929,90	25648,55	
606	26209,40	25972,74	
607	26579,70	26254,48	
608	26529,30	26618,77	
609	26709,20	26559,00	
610	26746,40	26745,10	
611	26779,30	26789,54	
612	27021,50	26818,33	
613	27033,40	27066,74	
614	26597,80	27072,61	
615	26811,40	26612,16	
616	27135,90	26843,79	
617	26957,30	27182,86	
618	27616,90	26985,30	
619	27702,30	27661,07	
620	27377,60	27740,22	
621	27781,40	27388,50	
622	27689,50	27823,88	
623	27842,40	27726,74	
624	27808,10	27875,90	
625	27689,20	27849,55	
626	28061,90	27722,49	
627	28500,90	28108,06	
628	28427,30	28546,85	
629	28402,70	28452,29	
630	28675,40	28429,89	
631	28713,50	28721,13	
632	28992,10	28752,43	
633	29188,10	29030,31	
634	29273,30	29227,90	
635	28730,70	29306,11	
636	29164,80	28738,63	
637	29343,00	29199,77	
638	29615,30	29385,15	
639	29776,70	29648,20	
640	29543,50	29812,44	
641	29727,10	29567,13	
642	30123,60	29765,08	
643	29945,40	30169,94	
644	29924,80	29970,92	

Result			
No	d _t	y _t	
645	29701,00	29951,21	
646	29683,20	29723,97	
647	29111,80	29712,06	
648	28175,90	29112,96	
649	28074,90	28144,97	
650	28257,70	28072,40	
651	27906,30	28284,99	
652	28000,00	27930,27	
653	28456,90	28031,13	
654	28951,40	28505,12	
655	29191,60	28995,39	
656	29372,20	29223,62	
657	29814,20	29401,64	
658	30020,40	29854,75	
659	30015,10	30055,52	
660	30908,00	30040,57	
661	31948,00	30957,84	
662	31701,60	32015,08	
663	31879,50	31716,76	
664	31832,50	31894,06	
665	31385,00	31868,11	
666	31485,40	31393,00	
667	32202,70	31507,71	
668	32711,10	32253,46	
669	32541,10	32753,89	
670	32632,40	32553,33	
671	33271,10	32657,13	
672	33294,30	33318,79	
673	33221,20	33322,66	
674	33719,30	33237,06	
675	33863,80	33762,34	
676	33465,60	33898,52	
677	33250,50	33472,43	
678	33516,00	33257,80	
679	33319,20	33548,08	
680	32745,00	33347,30	
681	33396,20	32738,69	
682	33333,20	33432,64	
683	34300,90	33365,11	
684	35624,80	34345,06	
685	34775,70	35701,47	
686	33510,40	34766,83	
687	33413,60	33448,76	
688	33506,00	33401,66	

Result			
No	d_t	y_t	
689	34040,20	33523,13	
690	33118,40	34084,70	
691	32054,30	33108,34	
692	31440,00	32004,58	
693	31850,70	31416,55	
694	31586,80	31871,35	
695	30766,70	31609,74	
696	31403,90	30745,57	
697	31428,60	31432,59	
698	31845,70	31463,62	
699	31670,00	31876,54	
700	31474,40	31697,43	
701	31273,30	31490,80	
702	31038,50	31288,73	
703	31964,00	31051,53	
704	32792,00	32015,46	
705	33152,10	32850,42	
706	33830,10	33186,04	
707	33749,40	33868,16	
708	33848,30	33769,85	
709	34709,70	33868,00	
710	34096,30	34760,21	
711	34171,50	34101,35	
712	34324,00	34179,05	
713	34866,60	34355,79	
714	35127,30	34908,51	
715	35314,30	35160,14	
716	35655,00	35338,54	
717	35254,10	35688,94	
718	36179,30	35266,46	
719	36907,80	36222,35	
720	36759,90	36960,01	
721	36621,50	36767,95	
722	37495,20	36628,81	
723	38088,70	37543,19	
724	38296,90	38133,15	
725	38573,70	38315,81	
726	39130,70	38597,05	
727	38917,80	39167,80	
728	38441,60	38931,23	
729	38587,80	38433,08	
730	37496,20	38603,22	
731	38202,20	37463,89	
732	37741,70	38222,35	

Result			
No	d_t	y_t	
733	37870,60	37749,88	
734	37631,60	37883,15	
735	37716,70	37646,13	
736	37960,10	37742,96	
737	37729,40	37996,97	
738	38210,20	37749,01	
739	38353,10	38245,17	
740	38919,50	38386,06	
741	39139,10	38952,46	
742	39015,90	39167,78	
743	39220,20	39026,95	
744	39837,30	39249,78	
745	39777,70	39879,46	
746	39790,70	39796,37	
747	40665,40	39804,05	
748	41362,50	40711,52	
749	41722,40	41406,39	
750	41905,40	41744,65	
751	43628,80	41921,50	
752	44076,90	43697,44	
753	42622,90	44118,92	
754	43645,20	42560,67	
755	44465,70	43663,58	
756	43851,40	44519,90	
757	44434,50	43834,01	
758	45746,20	44452,51	
759	45784,10	45808,83	
760	45315,20	45799,06	
761	44891,30	45291,43	
762	44590,20	44872,72	
763	45250,70	44576,53	
764	44841,00	45283,98	
765	44228,00	44848,27	
766	44855,60	44200,19	
767	44653,00	44879,70	
768	43842,70	44668,97	
769	44117,50	43809,92	
770	44772,90	44122,11	
771	44046,30	44813,79	
772	43507,50	44033,94	
773	43804,00	43475,52	
774	45361,30	43814,18	
775	46244,30	45428,82	
776	46689,00	46298,71	

Result

No	d _t	y _t
777	46710,90	46708,27
778	46265,40	46714,62
779	46553,60	46256,94
780	46838,10	46571,40
781	47728,50	46867,70
782	47015,90	47766,91
783	47493,00	47001,89
784	46890,80	47502,08
785	46366,20	46882,18
786	45997,10	46336,49
787	43889,80	45974,69
788	42340,40	43793,70
789	42863,40	42252,80
790	42521,90	42869,85
791	44346,00	42523,75
792	42906,70	44409,06
793	43236,70	42877,43
794	44051,30	43218,11
795	44688,10	44096,41
796	44426,30	44723,64
797	44399,40	44423,63
798	44328,80	44404,58
799	44531,20	44344,08
800	43273,90	44558,90
801	42710,50	43228,93
802	41742,10	42664,01
803	42507,00	41695,82
804	42941,70	42527,02
805	42911,30	42981,16
806	44028,40	42918,20
807	44070,90	44072,88
808	44088,60	44092,08
809	43710,60	44088,24
810	44284,20	43712,49
811	43099,30	44315,71
812	42890,30	43066,46
813	42505,00	42862,24
814	41919,30	42490,37
815	42212,00	41895,89
816	41860,70	42225,08
817	42864,90	41867,48
818	43732,50	42906,13
819	43872,80	43784,01
820	45075,90	43885,32

Result

No	d _t	y _t
821	45278,40	45119,90
822	45352,50	45302,89
823	44745,50	45352,88
824	43752,00	44733,20
825	43880,40	43700,00
826	44030,40	43870,57
827	44413,60	44049,30
828	44647,80	44443,32
829	44251,40	44672,52
830	44212,80	44250,59
831	44712,90	44219,66
832	44563,30	44747,33
833	43599,00	44579,17
834	43713,20	43560,14
835	41970,80	43705,76
836	40268,70	41902,11
837	41044,10	40176,40
838	40439,20	41057,58
839	39643,70	40435,68
840	36351,10	39604,56
841	37235,50	36245,76
842	36100,70	37251,31
843	36730,20	36101,77
844	38593,50	36744,01
845	38908,60	38686,02
846	37860,80	38957,26
847	38132,20	37818,94
848	38395,20	38135,82
849	39285,80	38426,10
850	37964,00	39330,80
851	37464,40	37931,65
852	36709,60	37423,42
853	35338,70	36680,59
854	34802,60	35279,87
855	34330,30	34770,79
856	32384,40	34315,37
857	32899,70	32316,95
858	33627,40	32901,33
859	34048,00	33680,43
860	34807,70	34082,90
861	34601,40	34849,16
862	33762,00	34616,01
863	34229,00	33736,34
864	33132,30	34248,95

Result			
No	d _t	y _t	
865	31950,60	33110,62	
866	32470,40	31894,34	
867	33207,10	32485,56	
868	34031,10	33260,76	
869	35453,30	34081,88	
870	35456,50	35533,93	
871	36481,20	35485,23	
872	35385,00	36522,08	
873	35698,70	35369,63	
874	36202,20	35701,02	
875	36148,40	36243,82	
876	35955,80	36168,77	
877	35815,50	35967,89	
878	35010,50	35832,24	
879	33831,70	34989,33	
880	32702,90	33779,55	
881	33618,00	32659,67	
882	33554,40	33648,02	
883	35311,00	33585,15	
884	34988,80	35384,24	
885	34959,00	35012,07	
886	35264,40	34952,59	
887	35984,50	35303,20	
888	36747,30	36030,92	
889	36101,90	36793,78	
890	36067,90	36094,53	
891	35742,80	36069,96	
892	35721,60	35746,53	
893	35262,90	35739,52	
894	36159,60	35264,03	
895	35967,50	36204,11	
896	36535,70	35992,13	
897	37563,30	36561,93	
898	37389,30	37620,27	
899	37418,10	37402,09	
900	37631,10	37424,01	
901	37806,50	37667,66	
902	38433,40	37839,54	
903	37885,30	38472,55	
904	37384,80	37888,50	
905	37164,90	37366,00	
906	37130,80	37158,98	
907	37121,80	37144,01	
908	36651,40	37148,38	

Result			
No	d _t	y _t	
909	36861,70	36653,61	
910	36686,70	36884,08	
911	36897,20	36707,61	
912	37285,90	36928,91	
913	37414,90	37326,01	
914	38139,10	37442,11	
915	38180,00	38178,27	
916	37689,70	38204,05	
917	37457,00	37682,68	
918	37372,00	37455,26	
919	37172,60	37382,18	
920	37624,50	37186,22	
921	37774,60	37662,75	
922	37478,70	37808,09	
923	38143,90	37487,32	
924	38245,90	38183,26	
925	38345,10	38277,37	
926	38275,00	38361,64	
927	37790,80	38300,92	
928	36390,00	37789,50	
929	36084,20	36330,17	
930	36432,40	36055,78	
931	36818,70	36452,47	
932	37268,20	36859,51	
933	36924,90	37301,57	
934	36983,90	36933,57	
935	36830,40	37002,31	
936	36389,70	36850,40	
937	36917,40	36389,51	
938	36737,60	36951,78	
939	36885,90	36762,63	
940	37449,20	36907,90	
941	37660,40	37492,58	
942	38316,90	37689,91	
943	38486,10	38351,92	
944	38998,00	38512,67	
945	38456,80	39026,68	
946	39743,80	38459,90	
947	39823,90	39790,67	
948	39643,80	39855,26	
949	40591,10	39637,52	
950	40683,30	40636,50	
951	40081,40	40710,46	
952	40582,30	40063,48	

Result			
No	d _t	y _t	
953	40601,70	40608,80	
954	39504,10	40629,45	
955	39307,10	39465,93	
956	39675,90	39285,15	
957	40163,70	39698,56	
958	39736,70	40203,19	
959	39890,90	39739,70	
960	39627,20	39907,60	
961	39030,30	39639,73	
962	39655,10	39014,56	
963	39654,10	39684,93	
964	39268,10	39682,43	
965	38432,80	39265,88	
966	38346,60	38400,18	
967	38501,10	38336,98	
968	37733,60	38521,35	
969	38077,10	37720,91	
970	37582,10	38093,49	
971	38238,60	37584,39	
972	37183,80	38272,61	
973	38066,90	37165,39	
974	38168,50	38093,00	
975	38196,50	38201,65	
976	37654,70	38206,16	
977	38163,00	37652,91	
978	38184,80	38193,54	
979	39857,80	38215,21	
980	39320,50	39924,59	
981	39461,90	39328,18	
982	39213,00	39455,70	
983	38874,90	39224,73	
984	39595,40	38875,41	
985	40204,80	39635,38	
986	39832,50	40248,99	
987	39071,10	39831,27	
988	38996,70	39041,64	
989	39083,00	38989,43	
990	39180,20	39101,12	
991	38705,40	39212,60	
992	38766,60	38708,48	
993	38610,60	38780,60	
994	39138,20	38626,27	
995	39117,50	39176,24	
996	39006,30	39144,18	

Result			
No	d _t	y _t	
997	38435,20	39018,34	
998	37832,10	38426,15	
999	37083,10	37806,44	
1000	36629,90	37049,45	
1001	37640,40	36606,63	
1002	38138,20	37685,30	
1003	39043,00	38182,62	
1004	38888,50	39085,56	
1005	39218,10	38900,54	
1006	40256,30	39235,24	
1007	40201,10	40309,55	
1008	41247,00	40218,10	
1009	41250,10	41284,86	
1010	42035,50	41272,64	
1011	42122,70	42064,13	
1012	41846,40	42146,51	
1013	41397,40	41843,83	
1014	41357,50	41387,65	
1015	41182,60	41361,35	
1016	42302,00	41191,87	
1017	43112,50	42351,23	
1018	42700,50	43162,54	
1019	42501,40	42691,16	
1020	42099,00	42494,84	
1021	41645,20	42090,13	
1022	42185,50	41628,83	
1023	42025,90	42213,25	
1024	42551,60	42046,43	
1025	43256,30	42578,68	
1026	43813,70	43298,74	
1027	43636,20	43844,54	
1028	44252,90	43638,82	
1029	44061,50	44280,73	
1030	42888,60	44077,57	
1031	43829,10	42837,63	
1032	43591,70	43851,33	
1033	43736,80	43607,18	
1034	41774,00	43742,52	
1035	41431,00	41694,53	
1036	39588,20	41382,37	
1037	40550,30	39525,87	
1038	39729,40	40559,61	
1039	40230,80	39720,42	
1040	40406,50	40243,51	

Result			
No	d _t	y _t	
1041	41406,90	40438,22	
1042	42056,30	41450,55	
1043	41978,30	42097,78	
1044	41666,00	41982,34	
1045	40501,90	41663,63	
1046	41195,20	40452,11	
1047	41819,80	41209,05	
1048	41922,20	41865,61	
1049	41817,70	41936,41	
1050	42419,40	41825,34	
1051	43239,80	42455,96	
1052	43408,70	43285,43	
1053	43263,60	43426,29	
1054	43097,10	43264,40	
1055	43079,50	43107,40	
1056	43666,20	43095,60	
1057	43661,10	43704,07	
1058	43542,20	43681,62	
1059	44309,30	43548,12	
1060	44660,70	44348,81	
1061	45714,10	44691,71	
1062	45845,20	45755,25	
1063	45889,20	45863,49	
1064	45339,80	45889,90	
1065	46105,80	45329,91	
1066	45566,10	46137,30	
1067	46044,20	45567,44	
1068	46697,10	46059,30	
1069	46621,50	46737,86	
1070	45634,00	46628,78	
1071	46308,10	45592,52	
1072	47355,80	46323,43	
1073	47014,90	47410,74	
1074	48032,70	47010,86	
1075	47826,10	48060,94	
1076	46861,30	47838,37	
1077	44984,50	46813,67	
1078	43529,50	44885,78	
1079	44256,10	43449,88	
1080	45077,70	44265,88	
1081	44818,10	45127,51	
1082	44681,10	44817,11	
1083	44707,30	44677,46	
1084	45102,70	44723,31	

Result			
No	d _t	y _t	
1085	45055,60	45135,25	
1086	44820,80	45074,03	
1087	45142,20	44824,37	
1088	44897,70	45169,07	
1089	45539,70	44911,18	
1090	45860,00	45570,45	
1091	46073,30	45890,44	
1092	46209,10	46087,50	
1093	46369,20	46227,11	
1094	46424,70	46390,23	
1095	46237,10	46444,33	
1096	46194,30	46247,23	
1097	46927,80	46206,70	
1098	47003,00	46966,01	
1099	46274,70	47022,61	
1100	47081,50	46247,96	
1101	46490,10	47109,10	
1102	46111,10	46487,86	
1103	46451,60	46087,77	
1104	45861,00	46467,70	
1105	44843,90	45853,70	
1106	44332,40	44789,83	
1107	44893,70	44292,40	
1108	44372,00	44912,79	
1109	44629,50	44373,17	
1110	44675,50	44642,09	
1111	45971,80	44698,49	
1112	46367,60	46022,60	
1113	46231,80	46399,55	
1114	46251,20	46223,75	
1115	45952,40	46263,36	
1116	45705,10	45955,89	
1117	45417,10	45701,70	
1118	46010,10	45410,76	
1119	45161,80	46041,98	
1120	46181,40	45145,80	
1121	47093,70	46210,66	
1122	47730,50	47146,93	
1123	48680,30	47758,98	
1124	49476,30	48717,16	
1125	49850,10	49512,29	
1126	49895,30	49865,38	
1127	51281,90	49897,99	
1128	50557,60	51330,47	

Result			
No	d_t	y_t	
1129	50055,50	50544,17	
1130	52005,80	50013,04	
1131	52086,70	52071,65	
1132	51774,40	52111,14	

**Test
Result**

No	d_t	y_t	
1	51643,80	51742,76	
2	51112,00	51640,70	
3	53325,30	51090,02	
4	52935,80	53396,58	
5	55625,40	52943,69	
6	54930,70	55708,73	
7	54831,90	54929,15	
8	52512,40	54788,43	
9	51561,90	52399,89	
10	51459,20	51471,28	
11	52824,90	51435,06	
12	51299,30	52876,19	
13	51393,60	51250,72	
14	50716,40	51359,43	
15	50429,90	50685,68	
16	50708,20	50406,39	
17	52070,60	50719,33	
18	49974,80	52124,87	
19	49186,40	49898,37	
20	50272,50	49102,10	
21	49880,90	50300,95	
22	47714,10	49886,11	
23	44473,30	47603,09	
24	46576,90	44339,18	
25	46148,80	46633,57	
26	45265,00	46171,55	
27	46882,00	45207,39	
28	47388,60	46933,13	
29	46824,00	47432,75	
30	47914,40	46795,78	
31	47750,70	47949,58	
32	48082,20	47766,18	
33	50198,60	48088,35	
34	49936,90	50281,27	
35	50032,60	49947,55	
36	49421,40	50013,29	

Result			
No	d_t	y_t	
37	49601,40	49403,87	
38	49050,40	49605,43	
39	48548,90	49035,94	
40	49296,20	48519,96	
41	49233,10	49323,07	
42	49680,50	49250,07	
43	50620,90	49695,68	
44	50536,50	50662,95	
45	50500,90	50540,96	
46	53884,10	50495,06	
47	53543,10	54011,51	
48	53882,10	53572,66	
49	53580,70	53861,77	
50	52893,20	53581,45	
51	54245,80	52857,09	
52	54390,20	54286,07	
53	54044,20	54411,67	
54	54198,00	54017,31	
55	54733,30	54205,47	
56	54164,90	54761,06	
57	54915,90	54150,43	
58	56793,00	54934,45	
59	56279,10	56868,06	
60	57910,60	56265,91	
61	57418,00	57942,85	
62	58053,40	57412,91	
63	58231,90	58050,20	
64	57185,40	58247,82	
65	57931,90	57133,64	
66	56268,20	57938,56	
67	55486,80	56198,81	
68	53969,80	55406,31	
69	55752,20	53882,56	
70	55638,90	55789,21	
71	55728,60	55655,54	
72	56446,60	55708,72	
73	56774,30	56475,94	
74	57615,70	56791,03	
75	57371,30	57639,18	
76	56855,10	57364,67	
77	56064,30	56821,28	
78	56906,00	56012,19	
79	56076,40	56922,34	
80	55160,80	56052,52	

Result			
No	d_t	y_t	
81	53689,10	55094,07	
82	54084,00	53598,02	
83	54719,00	54064,40	
84	55664,90	54748,96	
85	54743,00	55699,28	
86	54304,50	54707,76	
87	53262,90	54260,32	
88	53577,80	53201,53	
89	52615,60	53567,20	
90	52199,30	52576,10	
91	52331,30	52158,66	
92	52682,50	52327,76	
93	51452,30	52706,75	
94	53202,80	51403,15	
95	53181,20	53245,12	
96	54213,80	53202,83	
97	54320,00	54233,55	
98	54013,30	54333,62	
99	55521,20	53993,04	
100	56186,90	55568,95	
101	56490,60	56223,99	
102	56518,60	56489,92	
103	56271,30	56516,30	
104	56766,20	56264,20	
105	55239,00	56785,30	
106	54911,70	55173,28	
107	53603,40	54857,18	
108	54223,60	53532,04	
109	53847,40	54219,15	
110	55510,50	53840,66	
111	55380,70	55557,97	
112	55373,20	55390,52	
113	55233,00	55351,35	
114	55698,40	55234,51	
115	55538,10	55719,47	
116	54708,40	55543,09	
117	53541,30	54665,47	
118	52529,90	53464,92	
119	52569,50	52455,79	
120	53235,90	52545,57	

Result			
No	d_t	y_t	
121	52730,70	53264,83	
122	52351,00	52722,33	
123	51920,60	52324,93	
124	51480,90	51894,24	
125	50377,30	51453,71	
126	49093,80	50316,48	
127	48902,80	49012,15	
128	48657,50	48867,09	
129	45544,10	48643,29	
130	44593,70	45407,38	
131	42539,50	44518,15	
132	45010,70	42491,29	
133	45497,20	45076,31	
134	43706,70	45560,43	
135	44572,70	43626,79	
136	44304,40	44575,10	
137	42697,60	44313,45	
138	44452,10	42621,97	
139	45719,90	44495,02	
140	44350,80	45801,41	
141	43317,50	44302,79	
142	41866,40	43243,74	
143	41957,90	41798,81	
144	41342,80	41939,43	
145	43539,90	41324,63	
146	44752,50	43615,66	
147	45493,70	44840,99	
148	44305,30	45541,02	
149	45741,70	44260,91	
150	46249,30	45777,62	
151	45876,70	46294,34	
152	46446,60	45859,13	
153	45592,50	46470,75	
154	44895,00	45575,35	
155	45524,50	44850,02	
156	46260,30	45542,29	
157	45823,30	46305,05	
158	44776,90	45815,84	
159	43343,60	44724,26	
160	42923,00	43265,00	

APPENDIX_N

GARCH-DAN2 CALCULATION STEPS EXAMPLE

F₀ Node Calculations

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1		ISE				NN-GARCH						XrX		
2	Bo	Lag 1	Lag 2	Lag 3	Lag 4	σ ² (t-1)	σ ² (t-1)	ISE	Ypre	SE		1132	31354853.53	31313124.13
3		1	9752.86	10357.30	10837.50	10598.60	0.000268726	0.000618132	10161.20	9926.911	53957.97		31354853.53	1.02724E+12
4		1	10161.20	9752.86	10357.30	10837.50	0.000225238	0.000250498	10225.80	10313.38	7670.701		31313124.13	1.02578E+12
5		1	10225.80	10161.20	9752.86	10357.30	0.000188788	3.62173E-06	10204.10	10335.81	17347.46		31271956.83	1.02433E+12
6		1	10204.10	10225.80	10161.20	9752.86	0.000158237	2.33281E-06	10412.70	10290.1	15030.04		31232498.93	1.02296E+12
7		1	10412.70	10204.10	10225.80	10161.20	0.000132629	5.67711E-05	10124.90	10505.02	144493.7		17.0683143	17.08943867
8		1	10124.90	10412.70	10204.10	10225.80	0.000111166	0.000142756	10280.70	10203.93	5893.903		1597.380641	1607.634461
9		1	10280.70	10124.90	10412.70	10204.10	9.31762E-05	2.9924E-05	10467.90	10346.6	14712.51			
10		1	10467.90	10280.70	10124.90	10412.70	7.80976E-05	4.33806E-05	10348.30	10540.82	37063.92			
11		1	10348.30	10467.90	10280.70	10124.90	6.54591E-05	2.60417E-05	10590.30	10400.88	35881.31			
12		1	10590.30	10348.30	10467.90	10280.70	5.48559E-05	7.4415E-05	10570.40	10654.73	7112.254			
13		1	10570.40	10590.30	10348.30	10467.90	4.5987E-05	2.04319E-06	10544.70	10617.86	6352.063			
14		1	10544.70	10570.40	10590.30	10348.30	3.8545E-05	2.72923E-06	10881.90	10563.39	89109.45			
15		1	10881.90	10544.70	10570.40	10590.30	3.23073E-05	0.00014376	10825.90	10953.47	16274.82			
16		1	10825.90	10881.90	10544.70	10570.40	2.7379E-05	7.55325E-06	10931.10	10867.06	4101.425			
17		1	10931.10	10825.90	10881.90	10544.70	2.26369E-05	1.03522E-05	10742.90	10969.61	51397.44			
18		1	10742.90	10931.10	10825.90	10881.90	1.90239E-05	5.8662E-05	10725.70	10777.61	2694.418			
19		1	10725.70	10742.90	10931.10	10825.90	1.59452E-05	1.73545E-06	10945.70	10752.86	37188.75			
20		1	10945.70	10725.70	10742.90	10931.10	1.33548E-05	5.61764E-05	11032.00	10953.45	1485.85			
21		1	11032.00	10945.70	10725.70	10742.90	1.1202E-05	6.18273E-06	11122.00	11070.76	2625.66			
22		1	11122.00	11032.00	10945.70	10725.70	9.38921E-06	6.13788E-06	10658.30	11151.28	248983.3			
23		1	10658.30	11122.00	11032.00	10945.70	7.86977E-06	0.000316995	10659.90	10711.34	2646.242			
24		1	10659.90	10658.30	11122.00	11032.00	6.59521E-06	3.75023E-07	10921.80	10678.66	59115.37			
25		1	10921.80	10659.90	10658.30	11122.00	5.52375E-06	8.2651E-05	11013.80	10972.78	1682.769			
26		1	11013.80	10921.80	10659.90	10658.30	4.63404E-06	7.29887E-06	11302.50	11051.25	63127.75			
27		1	11302.50	11013.80	10921.80	10659.90	3.88412E-06	9.47931E-05	11775.50	11356.35	175687.4			
28		1	11775.50	11302.50	11013.80	10921.80	3.25555E-06	0.000250250	11607.30	11062.45	65103.29			
29		1	11607.30	11775.50	11302.50	11013.80	2.72371E-06	4.17359E-05	11669.30	11641.15	792.5275			
30		1	11669.30	11607.30	11775.50	11302.50	2.28713E-06	2.16160E-06	11754.00	11694.6	3528.028			
31		1	11754.00	11669.30	11607.30	11775.50	1.5457E-06	5.60901E-06	11809.60	11766.44	451017.6			

Formulas & Explanations of F₀ Node

- Column A** : =1
Column B : first inputs
Column C : second inputs
Column D : third inputs
Column E : fourth inputs
Column F : first inputs of GARCH model
Column G : second inputs of GARCH model
Column H : desired response d_t (actual value of ISE)
Column I : predicted value of ISE y_t

$$I3 : =L26+L27*B3+L28*C3+L29*D3+L30*E3+L31*F3+L32*G3$$

$$I4 : =L26+L27*B4+L28*C4+L29*D4+L30*E4+L31*F4+L32*G4$$

$$I5 : =L26+L27*B5+L28*C5+L29*D5+L30*E5+L31*F5+L32*G5$$

...

$$J3 : =(I3-H3)^2$$

$$J4 : =(I4-H4)^2$$

$$J5 : =(I5-H5)^2$$

...

L2:R8 : $X^t \times X$: {=+MMULT(TRANPOSE(A3:G1134);A3:G1134)}
L10:R16 : $(X^t \times X)^{-1}$: {=MINVERSE(L2:R8)}
L18:R24 : $X^t \times Y$: {=MMULT(TRANPOSE(A3:G1134);H3:H1134)}
L26:R32 : β : {=MMULT(L10:R16;L18:R24)}

α_i Calculations

U	V	W	X	Y	Z	AA
Norm R	Norm Xi	R*Xi	R * Xi	R*Xi		α_i
2,44949	20788,79	41546,26	41577,57	0,999247		0,038813
2,44949	20569,23	41103,86	41138,47	0,99928		0,03794
2,44949	20253,61	40497,16	40507,23	0,999751		0,022298
2,44949	20175,7	40343,96	40351,4	0,999816		0,019205
2,44949	20502,8	41003,80	41005,61	0,999956		0,009387
2,44949	20484,84	40967,50	40969,67	0,999947		0,010303
2,44949	20512,3	41022,40	41024,6	0,999946		0,010347
2,44949	20644,8	41285,20	41289,59	0,999918		0,012822
2,44949	20612,39	41221,80	41224,78	0,999928		0,012025
2,44949	20844,94	41687,20	41689,88	0,999936		0,011335
2,44949	20989,33	41975,90	41978,66	0,999958		0,009167
2,44949	21027,74	42053,70	42055,48	0,999958		0,009197
2,44949	21295,4	42587,30	42590,81	0,999918		0,012837
2,44949	21413,55	42822,90	42827,09	0,999902		0,013989
2,44949	21593,88	43183,60	43187,75	0,999904		0,013868
2,44949	21691,35	43381,80	43382,7	0,999979		0,006448
2,44949	21613,41	43225,60	43226,82	0,999972		0,007528
2,44949	21673,67	43345,40	43347,33	0,999955		0,009446
2,44949	21724,73	43445,30	43449,46	0,999927		0,012062
2,44949	21914,67	43825,40	43829,35	0,99991		0,013419
2,44949	21881,76	43753,00	43763,53	0,999874		0,015895
2,44949	21740,21	43472,20	43480,42	0,999811		0,019445
2,44949	21684,5	43362,00	43368,99	0,999839		0,01796
2,44949	21629,2	43253,80	43258,4	0,999894		0,014586
2,44949	21953,8	43893,00	43907,61	0,999781		0,020919
2,44949	22516,63	45013,60	45033,25	0,999564		0,029543
2,44949	22856,99	45699,10	45713,99	0,999674		0,02552
2,44949	23179,97	46354,60	46359,93	0,999885		0,01517
2,44949	23192,44	46395,40	46396,89	0,999893		0,005755

Formulas & Explanations of α_i Calculation Steps

Column U : =SQRT(1^2+1^2+1^2+1^2+1^2+1^2)

V3 : =SQRT(SUMSQ(B3:G3))

V4 : =SQRT(SUMSQ(B4:G4))

V5 : =SQRT(SUMSQ(B5:G5))

...

W3 : =SUM(B3:G3)

W4 : = SUM (B4:G4)

W5 := SUM (B5:G5)

...

X3 :=U3*V3

X4 :=U4*V4

X5 :=U5*V5

...

Y3 :=W3/X3

Y4 :=W4/X4

Y5 :=W5/X5

...

AA3 :=ACOS(Y3)

AA4 :=ACOS(Y4)

AA5 :=ACOS(Y5)

...

F_k Node Calculations

T2																	
	A	B	C	D	E	G	H	I	J	L	M	N	O	P	Q	R	S
1						1					(XrX)-1						
2	ISE	α_i	Ypre	SE		B0	Ypre (k-1)	Cos(ai)	Sin(ai)		1,12843E+11	0,012445822	-92090560831	-65214345039	Ypre	E	
3	10161,20	0,616544	9928,911	53957,97		1	9928,911	0,815882	0,578219		0,01244584	1,039E-11	-0,010185912	-0,00715222	10043,9	-117,295	
4	10225,80	0,616497	10313,38	7670,701		1	10313,38	0,815909	0,57818		-92090560835	-0,010185897	75154509476	53220992165	10430,79	204,992	
5	10204,10	0,615831	10335,81	17347,45		1	10335,81	0,816294	0,577637		-65214345034	-0,007152209	53220992158	37688701897	10483,71	279,6067	
6	10412,70	0,61574	10290,1	15030,04		1	10290,1	0,816346	0,577563						10440,79	28,09312	
7	10124,90	0,615542	10505,02	144493,7		1	10505,02	0,816461	0,577401		(XrY)				10660,27	535,3699	
8	10280,70	0,615555	10203,93	5893,903		1	10203,93	0,816453	0,577412		21626609,57				10359,27	78,5668	
9	10467,90	0,615555	10346,6	14712,51		1	10346,6	0,816453	0,577412		6,18526E+11				10501,76	33,86358	
10	10348,30	0,615596	10540,82	37063,92		1	10540,82	0,816429	0,577445		17655995,39				10694,88	346,5795	
11	10590,30	0,615582	10400,88	35881,31		1	10400,88	0,816438	0,577434		12489036,95				10555,41	-34,8917	
12	10570,40	0,615571	10654,73	7112,254		1	10654,73	0,816444	0,577424						10809,21	238,8148	
13	10544,70	0,615539	10617,86	5352,063		1	10617,86	0,816462	0,577399		B				10773,03	228,3306	
14	10881,90	0,61554	10583,39	89109,45		1	10583,39	0,816462	0,577399		-41368832				10738,59	-143,307	
15	10825,90	0,615596	10953,47	16274,82		1	10953,47	0,816429	0,577445		0,998831539				11107,04	281,1443	
16	10931,10	0,615618	10867,06	4101,425		1	10867,06	0,816417	0,577463		33787776				11020,23	89,13165	
17	10742,90	0,615616	10969,61	51397,44		1	10969,61	0,816418	0,577461		23870080				11122,72	379,8192	
18	10725,70	0,615509	10777,61	2694,418		1	10777,61	0,81648	0,577374						10933,18	207,4757	
19	10945,70	0,61552	10752,86	37188,75		1	10752,86	0,816473	0,577383						10908,25	-37,4496	
20	11032,00	0,615543	10993,45	1485,85		1	10993,45	0,81646	0,577402						11148,11	116,1136	
21	11122,00	0,615583	11070,76	2625,66		1	11070,76	0,816437	0,577434						11224,49	102,4942	
22	10658,30	0,615607	11157,28	248983,3		1	11157,28	0,816423	0,577454						11310,37	652,0713	
23	10659,90	0,615658	10711,34	2646,242		1	10711,34	0,816393	0,577496						10863,73	203,8268	
24	10921,80	0,615747	10678,66	59115,37		1	10678,66	0,816342	0,577569						10828,71	-93,0869	
25	11013,80	0,615708	10972,78	1682,769		1	10972,78	0,816365	0,577536						11123,58	109,7755	
26	11302,50	0,61563	11051,25	63127,75		1	11051,25	0,81641	0,577473						11203,92	-98,5776	
27	11775,50	0,615789	11356,35	175687,4		1	11356,35	0,816318	0,577603						11504,37	-271,132	
28	11607,30	0,616097	11862,45	65103,29		1	11862,45	0,81614	0,577854						11998,6	391,2967	
29	11669,30	0,61594	11641,15	792,5275		1	11641,15	0,816231	0,577726						11783,78	114,4817	
30	11754,00	0,615642	11694,6	3528,028		1	11694,6	0,816403	0,577483						11846,23	92,2308	
31	11754,00	0,615593	11754,00	15107,9		1	11754,00	0,816403	0,577395						11846,23	92,2308	

Formulas & Explanations of F_k Node

Column A : desired response d_t (actual value of ISE)

Column B : α_i values

Column C : predicted value of ISE (y_t) at node F_{k-1}

D3 :=(+C3-A3)^2

D4 :=(+C4-A4)^2

D5 :=(+C5-A5)^2

...

Column G : =1

Column H : Column C

I3	:	=COS(B3)
I4	:	=COS(B4)
I5	:	=COS(B5)
...		
J3	:	=SIN(B3)
J4	:	=SIN(B4)
J5	:	=SIN(B5)
...		
M2:P5	:	$(X^t \times X)^{-1}$:
		= {MINVERSE(MMULT(TRANSPOSE(G3:J900);G3:J900))}
M8:M11	:	$X^t \times Y$: {=MMULT(TRANSPOSE(G3:J900);K3:K900)}
M14:M17	:	β : {=+MMULT(M2:P5;M8:M11)}
R3	:	=M14+M15*H3+M16*I3+M17*J3
R4	:	=M14+M15*H4+M16*I4+M17*J4
R5	:	=M14+M15*H5+M16*I5+M17*J5
...		
S3	:	=+R3-A3
S4	:	=+R4-A4
S5	:	=+R5-A5
...		

CURRICULUM VITAE OF ERKAM GÜREŞEN

He borned in Balıkesir. He went to Hacıilbey Primary School and then Sırrı Yırcalı Anatolian High School. In 1999, he went to T.C. Ziraat Bankası Balıkesir Science High School. In 2002 he began to industrial Engineering in Yıldız Technical University, and graduated in 2006 with a CG of 3.25/4.00 . Graduate studies in İTÜ Industrial Engineering started in 2006 and still continuing.